The Apple User's Encyclopedia
(Apple II, II+, IIe, III)

Gary Phillips, Joyce Conklin, and Donald J. Scellato

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THE
APPLE USER'S ENCYCLOPEDIA
(II, II+, IIe, and III)

by

Gary Phillips, Joyce Conklin, and Donald J. Scellato

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PREFACE

The *Apple User's Encyclopedia (II, II+, IIe, and III)* is your one definitive reference book for your Apple computer—including the Apple II, the Apple II+, the Apple IIe, and the Apple III computers. By deciding to own it, you have made an investment in your computing future. It will save you hundreds of hours by bringing material from many sources into a single, easy-to-use, alphabetical reference handbook.

Much of the material is not available anywhere else. Here you will find the essential background material you need to answer your questions and solve problems concerning the family of Apple computers. The*Encyclopedia* covers the Apple II, II+, IIe, and III thoroughly, including all commonly used languages and operating systems. Whenever there are significant differences among the four Apple models covered, these are clearly noted.

Your *User's Encyclopedia* guides you through machine operation, BASIC programming, and what's available in software and hardware. The book will quickly pay for itself through product information alone, as well as being a comprehensive source of information about the whole area of microcomputers. The entries are short, clear, self-contained, and understandable. Should you desire additional information, hundreds of cross-references point you to related entries in the *Encyclopedia*. You will find it the most frequently used and most highly treasured volume in your personal computer library.

While your *User's Encyclopedia* was written in simple language so beginning users can understand it, you will continue to find it indispensable as your knowledge of computers grows. It does not offer detailed coverage of the internal electronic details of the Apple. It does, however, provide a complete reference for BASIC programming, general operation of the computer and its accessories, and available products.

Usually, you will use your *Apple User's Encyclopedia* as a quick reference source. You will probably keep it right by your computer, instantly available when you encounter difficulties or want a more complete understanding of what your Apple computer is doing. You will also enjoy just browsing through its many short, easy-to-read entries. This will easily and casually allow you to increase your knowledge of the Apple computer, and microcomputers in general. *The Apple User's Encyclopedia* was produced for you by Gary Phillips & Associates. Gary Phillips & Associates also provides *User's Encyclopedias* for the IBM PC, TRS-80, Atari, TI-99, and many other personal computers. This book will serve as your first reference for most questions. Manuals from Apple and other books provide a valuable backup to the *User's Encyclopedia*—when you have the time to explore a topic in traditional book presentation form. But when time is pressing and you need information fast, you will rely on *The Apple User's Encyclopedia. The Apple User's Encyclopedia* is organized alphabetically, with numbers and special symbols following "Z." Here are some special pointers for understanding the format of the *Encyclopedia*:

Variable types in various statements and commands are placed between arrow brackets. For example, <line number> means you would use a specific line number from your BASIC program. Similarly, <variable> indicates any variable you are using in your program. For example, the statement to display a variable's value is PRINT <variable>. To print out the contents of the variable Count, you would replace <variable> with Count, giving PRINT Count. Parentheses () around an item in a command or instruction should be typed in by the user at the keyboard. However, brackets [] indicate only that the enclosed material is optional; these brackets should not be entered into the computer. Also, q.v. is used after a word or phrase to direct you to other entries that you may want to see for additional information (q.v. from the Latin quo vide, "which see"). The names and addresses of all software and hardware manufacturers are listed alphabetically in the Vendors List at the end of the book. Unless otherwise stated, please note that all machine-specific entries refer to computers in the Apple II family.

We have made every effort to make your *Apple User's Encyclopedia* complete, accurate, and up-to-date. The descriptions of products are identified by an "*" following the product name. These may be either reviews or brief descriptions to help you find products you may want and acquire further information. You will need to check with the manufacturer or a retail outlet to verify the suitability of the product for your needs and to determine its price and availability. Similarly, you should verify any technical information in the *Encyclopedia* before relying on it for a major decision. Neither the authors, Gary Phillips & Associates, nor The Book Company will be liable for any errors or omissions in the *User's Encyclopedia*. If you should find an error, omission, or have any suggestions for improvements or additions to future printings or revisions of *The Apple User's Encyclopedia*, please write or call:

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Manufacturers of hardware or software who would like to be included in the next revision of *The Apple User's Encyclopedia* may send review copies and descriptive literature to the same address.

Congratulations on deciding to own the one definitive reference source for the Apple computer. We know you will enjoy and profit from it in the months to come.

Gary Phillips
Joyce Conklin
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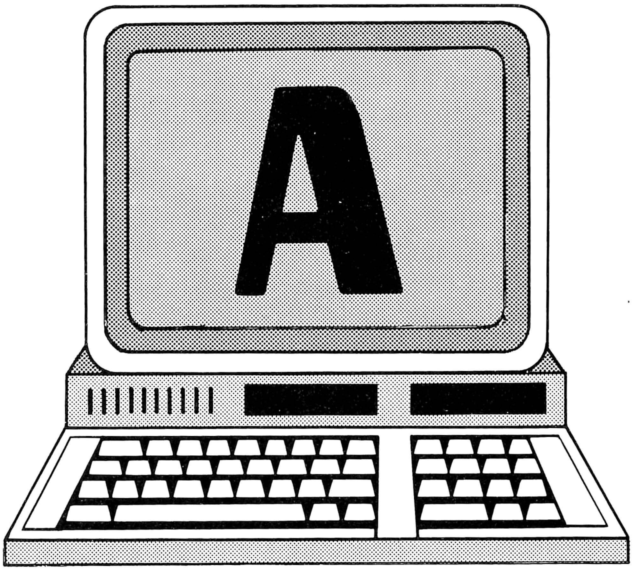


A Codes. ASCII = 65, HEX = 41. a—ASCII = 97, HEX = 61.

A Diagram symbol for accumulator. Also stands for Address parameter, and the hexadecimal sign for the decimal integer 10: A base 16 = 10 base 10 = 12 base 8 = 1010 base 2

Å Symbol for Angstrom, equaling one billionth of a meter (one nanometer).

A Parameter Address Parameter. When binary files are saved to disk the Apple's Disk Operating System (DOS) requires that five parameters be supplied prior to saving the file. Two of these parameters are absolutely required and three parameters are optional. One of the required parameters is the address parameter which specifies in either hexadecimal or decimal code the precise starting address of the binary file in the computer's memory. Any address expressed in hexadecimal must be preceded by the dollar sign ($). Decimal addresses are expressed as whole numbers and must lie between 0 and 65535 in a 64K system. In a 48K system, decimal addresses must lie between 0 and 49151. The other required parameter is the length parameter (see L Parameter) which signifies the number of bytes of memory to be stored onto disk. The optional parameters are the slot parameter, disk drive number 3, and the volume parameter (disk volume number). Examples of the use of these parameters follow:

Format:

```
   BSAVE <filename>,A<address>,L<length>,
         S<slot>,D<drive>,V<volume>
```

Hexadecimal:

```
BSAVE WALRUS.PIC, A$4200, L$2800, S6, D1, V254.
```

Decimal:

```
        BSAVE WALRUS.PIC, A16896,L10240.
```

A Register See Accumulator.

A: CP/M keeps an internal record of which disk drive is currently considered the "default disk" or "default drive." When you start a CP/M session, the default disk is always A. To change the default disk to B, enter B:. To go back to A as default, enter A:. To determine which is the default disk drive, look at the CP/M prompt (A> for drive A on the left, B> for drive B on the right). See CP/M.

A> Prompt CP/M. A> is a prompt from the disk operating system indicating that the drive A is the current default drive. This prompt is displayed on the screen when CP/M is ready to accept a command from the keyboard. This may occur when CP/M is first started up, at the completion of any command when A is the default drive, or when the user returns to drive A with the command A:. The disk directory is read only during the initial reference to the disk. Every time a disk is changed in the drive, a warm start should be performed on the system to enable CP/M to read the new disk directory.

AA2.5 Planets* Performs single or batch mode processing for dates from 1700 through 2300 A.D., within one minute of accuracy. Pluto is less exact outside of 20th century. 32K; 48K. Matrix Software.

AA3 Planets* Can produce one chart at a time (batch chart processing is not facilitated). The time period covered is 1800 through 2000, and planet accuracy is to one second of arc. Unless you need this kind of accuracy this program isn't recommended. This is a huge program which takes a while to run. 32K; 48K. Matrix Software.

ABBS* ABBS is an acronym for Apple Bulletin Board System. It is a general reference to electronic bulletin board programs which use the same command structure and conventions as the original program called ABBS. There are a large number of ABBSs throughout the United States. Each of these bulletin boards have common commands and features, although they each may deal with different topics. Software Sorcery, Inc.

AB-3D1 Basic 3D Graphics* An ideal program for applications that require high precision output (4,000 x 4,000). A load-and-go BASIC version of the 3D1 Graphics package that can be used with a plotter or in an application that results in processed output. Disk or cassette. Sublogic Communications, Inc.

Abort To end a program which has encountered an error condition and to return the control to an operator or operating system in an orderly manner. For the Apple, this is accomplished by pressing the CTRL-C keys together. In CP/M and MP/M an abort command exists which terminates the operation of a program. Example: A> Abort Lister where "Lister" is name of program which is running.

ABS BASIC Function. ABS returns the positive (absolute) value of the expression x without regard to negative signs. The format is:

```
<variable> = ABS(<x>)
```

<x> may be any numeric expression. For example:

```
10 PRINT ABS(-100)
100
```

The positive (absolute) value of -100 is 100.

This command is used by Applesoft BASIC, Intger BASIC, and Apple III Business BASIC.

ABS The Applesoft BASIC, Integer BASIC, and Apple III Business BASIC command which returns the absolute value of the number or numbers it precedes. Example: If you enter

```
PRINT ABS (-12.382)
```

the computer will respond with 12.382. If you Enter

```
PRINT ABS (-2.684) + 3.41
```

the computer will respond with 6.094.

Absolute Byte Parameter B Parameter. In Apple's disk operating system (DOS), a byte parameter can be designated with the READ or WRITE commands used with text files. The designation of this parameter causes the computer to begin reading or writing at that particular location in the text file. For example, the user could enter WRITE INTOWN,B6 which would cause the computer to enter the text file "INTOWN" in memory at byte 7 and to begin writing to disk from byte 7 to the end of the field (designated by a return) when the PRINT command sends this data to disk. Care must be taken to replace the exact number of bytes which are already stored in a particular field of a particular file when using this method to overwrite a file already stored on disk. Otherwise, part of the existing field may be left and will be mixed with the new data stored.

If the new data is longer than the existing data, the excess data will be stored in the next data storage field. If the data which exceeds the limits of the existing field is written into the final field of the file, the excess data will be stored on disk, but will be inaccessible when the data is read back into the computer. The user could also enter READ INTOWN,B8 which causes the disk file "INTOWN" to be read starting at byte 9, and to subsequently be placed in the computer's memory when the INPUT or GET commmands are given. Examples of the whole sequence of events are given below.

To make a sequential file named INTOWN:

```
10 REM MAKE INTOWNSEQ FILE
15 D$ = CHR$ (4): REM CTRL-D
20 PRINT D$; "OPEN INTOWN"
25 PRINT D$; "DELETE INTOWN"
30 PRINT D$; "OPEN INTOWN"
35 PRINT D$; "WRITE INTOWN"
40 PRINT "ROGER'S NEW HOUSE IS IN TOWN"
45 PRINT D$; "CLOSE INTOWN"
```

After entering this program, enter RUN. It will store the data in quotes on line 40 in a text file called "INTOWN." When this has been accomplished, enter NEW which clears the above program from memory. The next step will be to write a program which retrieves and prints the file "INTOWN" on the computer's screen.

To retrieve the sequential text file "INTOWN":

```
10 REM RETRIEVE SEQ TEXT FILE INTOWN
15 D$ = CHR$ (4): REM CTRL-D
20 PRINT D$; "MON C,I,O"
25 PRINT D$; "OPEN INTOWN"
30 PRINT D$; "READ INTOWN"
35 INPUT A$
40 PRINT D$; "CLOSE INTOWN"
45 PRINT D$; "NOMON C,I,O"
```

After entering this program, SAVE it as "Retrieve INTOWN" and enter RUN. This will cause the following data to appear on the screen:

```
OPEN INTOWN
READ INTOWN
?ROGER'S NEW HOUSE IS IN TOWN
CLOSE INTOWN
NOMON C,I,O
```

The next step will be to alter the data in this file through the use of the absolute byte parameter. This is done by first entering NEW and then by entering the following program.

To alter INTOWN at a particular byte:

```
10 REM WRITE AT A PARTICULAR BYTE IN A
FILE
15 D$ = CHR$ (4): REM CTRL-D
20 PRINT D$; "OPEN INTOWN"
25 PRINT D$; "WRITE INTOWN,B8"
30 PRINT "OLD HOUSE IS IN TOWN"
35 PRINT D$; "CLOSE INTOWN"
```

After completing this entry, enter RUN which will cause the data in "INTOWN" to be altered starting at byte 9. Then enter NEW to clear the program from memory. Then LOAD and RUN "Retrieve

INTOWN.” The monitor will display:

```
      OPEN INTOWN
      READ INTOWN
      ? ROGER’S OLD HOUSE IS IN TOWN
      CLOSE INTOWN
      NOMON C,I,O
```

Before going to the next step, enter NEW to clear this program from memory.

Next, we will use the absolute byte parameter to Read “INTOWN.” Enter the following program:

```
      10 REM READING FROM A PARTICULAR
        BYTE IN A FILE
      15 D$ = CHR$ (4): REM CTRL-D
      20 PRINT D$; “OPEN INTOWN”
      25 PRINT D$; “READ INTOWN,B12”
      30 INPUT A$
      32 PRINT A$
      35 PRINT D$; “CLOSE INTOWN”
```

The monitor will display “? HOUSE IS IN TOWN”

Absolute Field Position See EXEC.

Absolute Security* Allows you to send information over the telephone without fear of its being intercepted. Also transmits uppercase ASCII text files and requires code for access. 48K; cassette and modem. Dann McCreary.

Absolute Value The value of a number expressed as a positive number. Denoted by enclosure in vertical bars (|). Thus, if a number is positive or zero, |x| = x. If x is negative:|x| = -x. See ABS.

AC Alternating electrical Current.

AC or ACC ACcumulator, or ACcess time.The time required to retrieve a word from memory of any type.

Academic Apple, The* Written by Richard Mowe. An unusual book, written primarily to assist adults help children learn by using the Apple. Expectations of what a child should be able to do at various ages, from pre-school through high school, are addressed in the chapter called Getting Started. After discussion of the use of commercial software, Mowe then goes into programming and the requirements for designing your own software. The final section addresses learning to type and using the computer as a word processor. The appendices contain helpful forms, helpful books and magazines listed, sources of software evaluations, software recommendations, and a glossary. The reading level grade is 6. Reston Publishing Co.

Academic Skill Builders—Language Arts* This series of “edutainment” packages allows the student to work on six different word skills in the guise of an arcade-type game. All programs in this package (and in the Math package from the same company) allow a selection of a wide range of speeds, difficulty of questions, keyboard or paddle/joystick operation, and, in the case of the Language Arts programs, the option of turning off the sound. In a school setting, this is important—15 different systems all generating CTRL-G’s would cause chaos in the classroom! It is to be hoped that this modification will be added to the Math programs as well. It is possible to change the level of operation by pressing CTRL-P whenever the score or the Press Any Key message is displayed, and to terminate a game at any time by pressing T.

It is not possible to go from one of these games directly to Applesoft; the system will automatically reboot whenever RESET is pressed. You can, however, boot a new disk and in that way enter Applesoft, if desired. Each program comes with masters for making a student record sheet, a progress chart, a list of strategies for improvement, and several worksheets. Thus each student may have his/her own record and program for improvement. The manual comes with a section on teaching strategies and other aids which allow the program to be used either in the school setting or in the home.

Word Man is a grid of words with missing initial consonants. The current consonant is the moving part of the game; the student must decide whether this consonant will complete a word or not as it passes the other letters on the grid. Pressing the paddle button or the space bar will select the word; ignoring it will make the decision to pass up a non-word. When all word windows at the same level have been correctly selected, the grid becomes smaller. The object is to get the moving consonant to the center of the screen before the border closes in and touches the moving letter.

In *Word Invasion* an octopus at the bottom of the screen protects her territory from invading parts of speech; the part of speech is indicated in a box on the body of the octopus. The invading words come down from the top. For this reason, the player must continually move his/her eyes from one part of the screen to another, making it difficult to achieve a high score except at the slowest speeds.

Spelling Wiz shows a word with a missing letter—or letters in the more difficult levels—at the top of the screen, and four choices at the left. The player moves the Wizard’s wand to point up to four choices at the correct letter(s) and presses the button/space bar. If the choice is correct, the letter moves to the word at the top, and the Wizard’s hat brim flops. If the choice is incorrect, bubbles coming from the list of letters continue to approach the wand; if the bubbles touch the wand, the round is over and the screen resets. If this happens three times, the game ends.

Verb Viper is a creature like the Loch Ness monster who eats verbs approaching him from caves on the opposite side of the screen. The player decides if the verb matches the subject which appears near the Viper's head. If it does, the player presses the space bar/paddle button to "eat" the word. Successful play advances the Viper's head to higher caves, which are also closer to the Viper, so there is less time to make a decision. Too many incorrect choices lower the Viper's head and eventually cause the screen to reset. Three resets will end the game.

Word Radar plays like Concentration. Words display briefly at the beginning of the round and then blank out within white boxes. The player must move the "word viewer" (a blue box which displays one word at a time) until the word displayed matches the one at the bottom of the screen. Firing the button or pressing the space bar will display the word permanently in its box on the screen. All this time the radar beam moves around the circle; the object being to display all the words before the beam makes a complete circle. The game is especially designed to assist in recognition of words without phonetic deciphering.

Word Master allows review of synonyms, antonyms, homonyms or a mixture of all three. Eight words appear at the periphery of the screen and start building lines toward the center. Use of the arrow keys or the paddle rotates the aiming device in the center; space bar or button fires. If the selected word matches the word in the center of the screen as to type (indicated at the bottom of the screen), the player scores. An incorrect selection scores a miss, and the lines continue toward the center. If any line touches the center before all words have been correctly identified, the screen resets. Three resets end the game. The default speed (7 out of a possible 9) is extremely fast for this game.

These programs are all designed for drill and practice, rather than independent learning. The language drills do not allow for alternate meanings or alternate parts of speech; for example, the game asks for the synonym of "kind" and the only choice is "nice", rather than "type." The part of speech for "jump" is listed as a verb, although it may also be a noun, depending upon the context of the sentence. Some educators may not agree with this presentation, or with the sequence of number skills in the math programs; if it is remembered that the teacher is still needed for initial instruction, these programs serve to motivate extra practice. Developmental Learning Materials.

Academic Skill Builders—Math*. This set of programs, like the companion series for Language Arts, presents drill and practice in the guise of arcade games. Because of the necessity of typing in the answers when in the keyboard mode, these games are much easier to play with a joystick (without self-centering) or game paddles. In this latter mode, the answers appear on the screen and the player must select the proper target to match the answer. There is an opportunity to change the default selections for level of difficulty and speed of play by pressing CTRL-P whenever the score is displayed or when the Press Any Key message is showing. A game may be stopped at any time by pressing T. The score to that point will be displayed. There is no option to turn off the sound in this series of games. The programs come with duplication masters for the same record sheets provided in the Language Arts (q.v.) series; in addition, there is a set of flash cards for each program.

Alien Addition has addition problems in "space ships" coming down appearing in the cannon sights. The player matches his answer/missile with the correct problem/space ship before firing to score a hit. If any space ship reaches the bottom of the screen without being destroyed, the screen resets. Three such resets end the game. When a space ship is destroyed by the selection of a correct answer, it is immediately replaced with another one at the top of the screen.

Minus Mission is similar to the addition game, but the invading monster is a large green slime, with the problems appearing in dripping blobs. The cannon is represented by a robot which fires two parallel laser beams to destroy the blob. A blob reaching ground level without being destroyed will disintegrate the robot; three robots constitute a game.

In *Meteor Multiplication* the problems appear in meteors around the edges of the screen. The meteors move toward the center where a star ship with the answer awaits. The player aims the gun with the paddle and fires with the button. A meteor reaching the ship undestroyed will shatter the ship; three ships constitute a game.

The theme of *Demolition Division* is cannons firing at oncoming tanks containing division problems. The answer appears near one of the cannons on the right of the screen. The answer must be moved with the paddle (paddles work much easier than joysticks on this one) to the correct cannon before firing. The on-coming tanks are also firing at the walls protecting the cannons; if the tank overruns any cannon the round is over. There are three rounds to a game.

Alligator Mix works on both addition and subtraction problems randomly selected. As the apple with the problem approaches the alligator, the player must decide if the answer matches the one shown in the alligator's stomach. If it is a “good apple” (the right answer) the player opens the alligator's mouth by pressing the space bar/paddle button. If the player gives the alligator a bad apple it will grumble. There are a total of five alligators with ten problems each; the later alligators are closer to the source of the apples so the speed of the game increases.

Dragon Mix mixes multiplication and division problems with a dragon protecting her city by breathing fire. Although the method of destroying the invading forces is to aim the dragon's head and then fire, the head movement seems to be under fixed control, so that the player must wait until the correct answer is indicated before belching fire from the dragon. If an invader reaches the dragon without being destroyed, the city will explode. Developmental Learning Materials.

Accelerator II* This is a card which may be installed in any slot except slot 0, and will increase the speed of operation of your programs by a factor of 3.6. The board contains a 3.6 MHz 6502 processor and 64K of memory. Programs which are run in the main 48K of RAM on the Apple II/II+ will automatically be transferred to the memory on the Accelerator and run at the faster speed. For other programs, a pre-boot disk is provided which may be copied with special parameters for Applesoft (Apple II+), Integer (Apple II), Pascal, or CP/M using the Microsoft Z-80 Softcard. (The Accelerator is not compatible with a Z-80 card not using direct memory access.) An example of the increase of speed is shown for the following Applesoft program:

```
10 HOME: DIM A$ (100)
20 FOR I = 1 TO 100: FOR J = 1 TO 10
30 X = INT (RND (1) * 26) + 64
40 E$ = E$ + CHR$ (X)
50 NEXT J
60 A$ (I) = E$ : E$ = “” : NEXT I
70 PRINT CHR$ (7); “LOAD COMPLETED”
80 SW = 0
90 FOR L = 1 TO 99
100 IF A$ (L) =< A$(L+1) THEN 120
110 T$ = A$ (L) = A$ (L + 1) = T$ : SW = 1
120 NEXT L
130 IF SW = 1 THEN SW = 0 : GOTO 90
140 PRINT CHR$ (7); CHR$ (7); “SORT
  COMPLETED”
150 FOR M = 1 TO 100 STEP 2
160 PRINT A$ (M); TAB(21); A$(M+1)
170 NEXT M
180 PRINT CHR$(7); CHR$(7); CHR$(7); “PRINT
  OUT COMPLETED”
190 END
```

The timing lines are 70, 140 and 180; the respective cummulative run times are shown in the table below:

FUNCTION	WITHOUT ACCELERATOR II	WITH ACCELERATOR II
Load 100 elements with 10-alpha characters (line 70).	19.35 sec	5.85 sec
Bubble sort of 100 elements	2.52 min	46.9 sec
Array (line 140). Print-out of 100 elements (line 180).	2.54 min	47.3 sec

Dip switches on the Accelerator II board must be set to off for each slot which controls a slow-speed peripheral such as a disk drive or a modem. If you are also using the Microsoft Z-80 Softcard, the Accelerator must be installed in a lower numbered slot than the Softcard. Saturn Systems.

A-C-C-E-S-S* The Automated Computer Communications Electronic Service System will function as an electronic mail handler, a message center, a system for direct entry of data, and a bulletin board. Input may come from any type of standard terminal, and there are almost twenty-five functions available. 48K; two disk drives, modem, clock, printer, and Videx 80 column card or lower case adapter. Desert Technology.

Access Time The time it takes to get a byte of information from memory.

Accessing Files (Apple III) The Apple III computer uses Sophisticated Operating System (SOS) as a control and data handling system. SOS is loaded into the computer's memory each time the system is booted. On the Apple III files can consist of any type of alpha or numeric data, programs, screen pictures, or whatever. All such files should be named by the user to allow easy recognition and retrieval. Files which are stored on disk are said to be stored on a "block device" in Apple III terminology. Files may be displayed on a "character device" such as the screen of the console. When they are displayed on the screen, they are also available in the computer's memory. They may also be stored on hard copy print-out.

Files which are stored on block devices such as a disk drive or hard disk are files which the user wishes to keep in some permanent fashion. They will be there when the computer's power is turned off. Block devices can hold numerous files of many different types. With SOS, files can be grouped together in any fashion the user desires. They can be classed by file type, by subject, by intended use, and so on. This classification is accomplished by building directories and subdirectories of files. In SOS, a directory is a file which lists other files. Each disk used for storage is usually named to reflect its purpose. An example is GENSTORAGE which has a very specific purpose. The files listed in a directory in SOS are given "local" names which more carefully specify their purpose. Some examples in the PAYROLL directory might be EMPLOYEE, PAY SCALE, TAX, HOURS, and any other similar files. Employees can be broken down further into a subdirectory which contains further files such as A THROUGH D, D THROUGH M, etc. Files are accessed by first recognizing the block device on which a file is stored. .D1 in front of a file name designates that the file is on drive number 1. This might be followed by PAYROLL to view the contents of the directory on the disk containing the PAYROLL file. The user can then view the entire directory on this disk or can reach further by using "pathnames." He could have typed .D1/PAYROLL/EMPLOYEES, to get to that file or .D1/PAYROLL/WAGE RATES to read, add to, or change that file. File access through SOS is relatively simple and convenient.

Accession Plus +++* Create a database for your library. Books can be cross-referenced by title, subject, or author for quick and easy access. Cassette or disk. Right On Programs.

Account Keeper* A small business accounting system that posts accounts by month, account, and summary. Features trial balance, monthly detailed reports, and a check register. A very flexible system. Disk; Applesoft II. Monument Computer Service.

Accountant, The (Finance Data Base System)* A menu driven sytem on two disks. This package is easy to use (demonstration program included), has single key commands, page/scroll modes, prompt/nonprompt modes, outputs to the screen or printer, and offers the capability of renaming accounts or codes. 48K. Optional printer. Decision Support Software.

Accountant/Complete Accounting System* Includes General Ledger, Accounts Receivable, Accounts Payable, and Payroll. All calculations and updates of any section can automatically be changed on the general ledger or independently. It's easy to use and comes with good documentation. Insoft.

Accounting Applications for the Microcomputer* A supplement to any introductory college-level accounting text or computerized accounting course. Students use computerized accounting record maintenance procedures. Disk, DOS 3.3. McGraw-Hill Book Company.

Accounting Assistant* A complete financial planner that keeps records of purchase orders, vendor names, checks, and balances. A maximum of 300 purchase orders, 500 expenditure accounts, 600 vendor records, and 500 payments can be stored on a disk. A systems manual and reference manual are included. Scott Foresman & Co. Electronics Publications.

Accounting Software See Account Keeper; Accountant, The; Accountant/Complete Accounting System; Accounting Applications for the Microcomputer; Accounting Assistant; Accounting System; Accounting Tutor; Accountingplus II; Accounts Payable; Accounts Receivable; Accounts Receivable/Osborne Conversion; Accounts Receivable System; Accounts Receivable/Payable; B.I.S. General. Ledger. On. Line; BusiComp; Computer Programmed Accountant—Series; Computerized Farm Accounting System (CFAS); Construction Accounting System; Construction Bookkeeper; Construction Cost/Profit Analysis; Controller, The; Cost Accountant; CP/M...Critical Path Method Scheduling; Data Plus; Depreciation; Depreciation Planner, The; Depreciation/Critical Path/Profit Analysis; Desk Calculator II; Discounted Cash Flow Analysis; Equip; Estimator; Evaluate; EZ-Invoice 1.0; EZ-Ledger; Financial Management System II & III; General Accounting Package; General Ledger; General Ledger Accounting System, General Ledger System; GL-Plus; Hard-disk Accounting Series, The; How to Use VisiCalc; In Soft Accountant, The; Incomplete Records Accounting System; Insurance Broking System; Interest and Loans, Investments and Record of Investments; Inventory; Inventory Control; Inventory Management System for Stock Control; Inventory Manager, The; Inventory Pac; Inventory Program; Inventory Software Packages; Job Cost Accounting; Job Costing System; Job Estimating & Cost; Legal Accounting; Maxiledger; Micro DSS/F (Decision Support System/Finance); Microbomp; Microcomputer Accounting Applications; Microcomputer Testing Program for Accounting: Systems and Procedures Fourth Edition; MicroLaw; Micropay; Microrec; Multi-Year Planning Model; NDSL Internal Billing System (NIBS); No-Nonsense Books; Omnibus Banking & Financial Pak; One-Type Account System 1; Paymaster; Payroll; Payroll for the Apple II Plus; Payroll Module; Payroll Package; Payroll Software Packages; Payroll System; Payroll/Cost Distribution System; Payroll/Personnel; Paysystem Accountant; Performance Manager; Plan 80; PlannerCalc; Planning Cash Flow; PRICE QUOTERtm; Professional Client Billing Series III; Property Management; Purchase Ledger System; Real Estate Analysis; Real Estate Analysis Package (REAP); Real Estate Analyst; Real Estate Office Management; Real Estate Series; Rental Manager; Retail Accounts Receivable; Sales Ledger System; SBCS Accounts Payable; Sir Isaac's Yield Calculator; Small Business Software; Software Pac #7; Student Payroll; Super Calc; SUPR' Ledger; Systems II Accounts Receivable; System II EX; Systems II Ex—Payroll; Tax Advantage; Tax Planner; Tax Preparation; Tax Preparer; Time & Money Meter; Time and Cost Recording System; Time Clock II; Time II; Time Manager; Time Master; Total Payables; Total Receivable; Total Sales; TPS Canadian Payroll System; Tracking; Universal Computing Machine; VC Expand 80; VC/80; Vertex Business Software; VisiCalc Templates Real Estate Analyst; VisiCalc; VisiCalc 3.3; VisiDe; VisiList. See also General Ledger Software; Payroll Software Packages; Tax Software Packages.

Accounting System* The Peachtree/40 Accounting System. These four packages are designed to run independently, or can be configured in any combination to meet your needs. When the four packages are run as a whole, they make up a completely integrated system.

General Ledger is the center of the full accounting system. This package records all transactions and is the basis of key financial statements. Access to current accounts is easy and rapid.

Accounts Receivable generates invoices and monthly financial statements while monitoring your current and aged receivables. You can keep a customer file with credit information and account status, and retrieve this information immediately.

Accounts Payable writes checks and organizes your aged and current accounts payable. A vendor file is established with information on discount terms, account status, and purchase order data.

Payroll takes care of payroll preparation for different categories of employees, i.e., salaried, hourly, or commissioned, writes checks, and maintains necessary information for tax preparation. It generates W-2 forms and includes withholding and FICA tables.

The Accounting System requires a Z80 softcard, 40-column screen and single density 5-¼" disk drive. Peachtree Software, Inc.

Accountingplus II* Includes General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, Labels Plus, GL Plus, Invoices Plus, and Payroll. Software Dimensions, Inc.

Accounts Payable (Computer Programmed Accountant)* The Accounts Payable Software is a collection of programs by Continental Software Co. which may be used as a stand-alone system or which may be integrated into Continental Software's General Ledger system. This software uses a Purchases Journal to record invoices and credit memos. It uses a Cash Disbursements Journal to record and print checks, and to mark invoices for payment. The software also posts invoices and credit memos to a subsidiary ledger. The Purchases Journal and the Cash Disbursements Journals may be printed by the user. Particular accounts may be looked up. The user may generate and print Aging Reports. Vendor purchases may be listed on a monthly, year-to-date, and date of last purchase basis. The documentation for this program is complete and is very easy to use. It contains an introductory overview and detailed explanation of the use of each menu option. The software is menu-driven. It can be configured for a variety of printers and for computer systems with a variety of components. The composition and use of the accounts payable system is logical. It has been constructed in a fashion which helps to avoid and to detect mistakes and faulty input. The program and its documentation are user-oriented. 48K; 2 disk drives; DOS 3.3. Continental Software.

Accounts Payable* An on-line, real time system with B Tree index. Access speed is 60,000 records per second. 48K; Z80. Facts Management Systems, Inc.

Accounts Payable* Sorts and keeps a monthly ledger for up to 125 accounts. Will produce a report of up to fifteen outstanding bills. Accounts may be updated easily. Golway Computer Enterprises.

Accounts Payable* This integrated accounting package posts all transactions automatically to the General Ledger; distributes entries to up to twenty-one general ledger accounts; maintains invoices in an open-item format, allowing each invoice to be payed partially or in full; keeps track of discount and due dates; and keeps up to 250 user-defined vendor files. Sentient Software.

Accounts Payable* Items from any one of these six-digit-named invoices may be posted to as many as ten accounts. Automatic payments may be made to any account on a periodic basis, and specific invoices can be flagged for temporary non-payment. Printer required. Westware Software, Inc.

Accounts Payable* A valuable accounting tool. This system keeps track of invoices to be paid, due dates for discounts, specific cash requirements, and prints checks and a check register. Vendor status reports are readily accessible, as well as open invoice reports, and aging reports. Peachtree Software, Inc.

Accounts Receivable(Computer Programmed Accountant)* The Accounts Receivable module of Continental Software's Computer Programmed Accountant is a complete accounts receivable system for the Apple II computer. The method used for this system is similar to the method used by accountants to record accounts receivable. It provides a Sales Journal which records and prints invoices and credit memos. It maintains a Cash Receipts Journal, and posts customer accounts. It gives the user the ability to print the sales journal, the cash receipts journal, customer statements, and aging reports. It reconciles cash receipts, credit memos, and invoices. It can also issue reports on customer activity and sales activity on a monthly, year-to-date, and date of last sale basis. This program may be used as a stand-alone program or on an integrated basis with Continental Software's General Ledger program. It uses DOS 3.3 initialized diskettes for data storage, and the program diskette may be copied for backup purposes. The manual which accompanies this software is quite complete and easy to use. It takes the user on a step-by-step familiarization trip through the use of the software. 48K; two disk drives; DOS 3.3. Continental Software.

Accounts Receivable* An on-line, real time, compiled system with B Tree index. Access speed is 60,000 records per second. 48K; CP/M and Z80. Facts Management Systems, Inc.

Accounts Receivable* Manage your current and aged accounts receivable with this system that handles invoicing and monthly statements. It features a customer file, tax file, transaction update, invoicing, open credit accumulation and reconciliation, processing for end-of-period, and more. Peachtree Software, Inc.

Accounts Receivable* Keeps a monthly ledger and generates a ledger report for up to 125 accounts. Accounts may have up to fifteen outstanding invoices, may be sorted by name, and can be added to or deleted from at the user's convenience. Golway Computer Enterprises.

Accounts Receivable* Automatically posts all transactions for up to 600 customers to general ledger, and will distribute sales journal entries among as many as twenty-one general ledger accounts. Keeps track of receivables on a balance-forward basis and and ages them automatically, applying payments to any period. It also prints transaction records for customer accounts each month, and allows easy update of customer files. Will produce reports for sales and payments journals, a customer master file, a detailed aged trail balance, a finance charge report, and statements. Printer required; disk. Sentient Software.

Accounts Receivable* This interactive invoice system interfaces with the general ledger to generate an onscreen worksheet. It prints invoices, mailing labels, customer statements, and generates the following reports: Sales Analysis, Customer Listings, Invoice Search, and Aged Receivables. Spectrum Software.

Accounts Receivable* This system allows six-digit customer codes, as well as job and invoicing numbers. Keeps a record of each customer's last transaction, and a billing record for the past two years. It automatically calculates income tax, and will record invoice and shipping amounts as well as payments received and billing status. Invoices may be entered into the system at any point from prebilled to post-paid. Complete reports are available for all stages of billing. When used in conjunction with the manufacturer's general ledger, it allows you to format your own departmental financial statements as well as a balance sheet and income statement. Reports may contain up to ten subtotals. The system generates customer statements, posting invoice amounts to the general ledger. Requires a printer. Small Business Computer Systems.

Accounts Receivable/Osborne Conversion* An open invoice system; converted from the Osborne/McGraw-Hill version; can be integrated with the SBCS General Ledger. Includes credit and debit memos, full or partial payments, progress billing, invoice aging, and statement printing. 48K; two disk drives, 132-column printer. Small Business Computer Systems.

Accounts Receivable/Payable* An accounting system for home or small business use. You can manage up to eighty accounts, using your own account names and numbers. Current balances are easily accessible, and there is an EDIT function so you can quickly correct, add, or delete any entries you wish. 48K, one disk drive, and monitor required. Printer optional. Business Master.

Accounts Receivable System* This menu-driven program will handle up to 2500 entries each month, spread over 400 customer accounts. Records cash and charge amounts received, bills accounts, and prints packing slips, sales invoices, and four form letters for collection purposes. It also prints address labels for any specific subcategory of addresses in memory, as well as promotional headers for invoices, etc. The program will maintain records of past purchases, a complete billing record, and balance for each account. Generates the following printed reports: Account Status Report, Accounts Receivable Status Summary, and Aging Summary with Analysis. All records may be viewed on screen or printed out. Money Disk.

Accounts Receivable System* BPI's match for the General Ledger Accounting System. Includes: The Customer Statement, The Customer Credit Analysis, and The Accounts Receivable Ledger. BPI Systems.

Accumulator One of the microprocessor chip registers. The A (Accumulator) register is the register which stores the results of mathematical operations. It also acts as a temporary storage place for data being moved from one memory location to another. More than one accumulator can be in a central processor. From the system monitor which is accessed by typing CALL-151, the contents of all of the registers may be viewed by pressing the Control key and "E" key at the same time (CTRL-E) followed by return. Doing this will result in a display like the following:

A = 98X = BBY = D8P = 00S = B7

where the contents of the accumulator appear after "A". See Register.

Accuracy in Digits In Applesoft BASIC, numbers may be displayed with up to nine decimal digits of accuracy. Although numbers are stored within the computer's memory to more than nine digits of accuracy, when the computer is instructed to print a number larger than nine digits, only nine digits are shown. Larger numbers will also display exponents. Examples are shown below:

INPUT	*OUTPUT*
PRINT 999999999	999999999
PRINT 999999999991	E+11
PRINT -999999999	-999999999
PRINT -99999999999	-1E+11

See Number Format.

AccuRec Time Recorder/Wage Summary Program* A great idea for every business. Keep accurate records of employee hours and wages. Calculation of salary includes overtime and benefits. Individualized Operand (IO).

Accu-Shape* This program allows you to create shapes as well as experiment with designs. Features: lo-res screen, global edit commands, a powerful trace routine, a strong hi-res routine, and a table options routine that can give you added flexibility. Accent Software.

A.C.E. (Applesoft Command Editor)* The principal feature of this program is the ability to load the Renumber program onto the A.C.E. disk. Renumber will be loaded above HIMEM, along with A.C.E., when you boot the disk. This program contains the usual features of a line editor for BASIC, such as being able to define your own keyboard macros, cursor moves for editing, and insertion and deletion modes. Also included is an automatic line numbering feature, so that as you are entering your BASIC program, you may specify the beginning line number and the increment to be used; then as you press RETURN to end a line of code, the next line number will be entered automatically and the cursor will be at the correct position for entering the next line of code. The instructions for defining the keyboard macros (q.v.) are easier to understand than some found in similar programs; these macros are limited to a maximum string length of seven characters. Thus, while you define a macro to be RUN or CATALOGed, you could not have one called "SAVE MY PROGRAM." As with most other programs from this company, you are allowed a total of 3 copies for archival purposes, after which the copy program on the master program disk will work only for standard DOS diskettes, and will no longer work to make a copy of A.C.E. Southwestern Data Systems.

ACIA Asynchronous Communication Interface Adapter.

ACIA Error Message The Apple III computer performs a number of automatic diagnostic tests when it is turned on. One of these diagnostics is a test of the circuits which make up the Asynchronous Communications Interface Adapter (ACIA). An ACIA error message is displayed if this adapter has failed. The manufacturer recommends that any Apple III computer which displays this message be returned to an authorized dealer before you attempt to use this interface.

Acid-Base Chemistry* An eleven program set which comprehensively covers acids and bases demonstrations and drills. Programs For Learning, Inc.

Acids and Bases* Talks about ph values, how to neutralize them, properties of bases, acids, and salts. Designed for junior high school students. 48K. J & S Software.

ACK ACKnowledge character in ASCII, a 06 base 16. This is used in communications to complete a handshaking sequence. The ACK signal indicates that the information has been accepted.

ACM Association for Computing Machinery
11 W. 42nd St. 3rd Floor
New York, NY10036
212-869-7440

The major international society for computer technology is the ACM. See also Association for Computer Machinery.

Acolyte, The* This device gives you hardware control of your computer memory and program flow. Allows you to read and write to memory, interrupt and alter program flow, slow execution speed, and trace program execution. Access Memory.

Acoustic Coupler A mechanical instrument for connecting the telephone handset to a computer, though a modem. The data is converted to tones—usually audible—for transmission over the phone lines.

Active Filter Design* Helps review the design of filtering systems. Subjects include: Bandpass Filter with Q's less than ten and fifty, Staggered-Tuned Butterworth Bandpass filters, Notch Filter, and Low and High-Pass (Bessel, Butterworth, 1,2 and 3-db Chebyshev). Advanced Operating Systems.

Activity Accountant* Records and updates available funds and transactions for a school building. A maximum of fifty schools can be handled, along with their corresponding accounts. This allows the cash-flow to be analyzed for a complete district. Scott Foresman & Co. Electronics Publishing.

A/D "A to D." Analog to Digital. Conversion from a sensor's analog voltages and currents to the digital representation used by computer systems. The computer can then process data directly from the external world. Example: An electrical voltage that represents temperature is converted to a binary number which the computer can use.

A-D Converter* This analog to digital converter is available on a board that will fit in any slot of your Apple computer. Includes a sixteen channel multiplexer and an 8-bit analog to digital converter. John Bell Engineering Inc.

A/D Error An Apple III error message displayed after completion of boot-up diagnostic test. This message indicates a failure in the analog to digital converter which connects the joysticks to the computer. The manufacturer recommends that anyone who encounters this message take the computer to an authorized dealer for repairs.

ADALAB Interface Card* Makes data collection and instrument control possible with your Apple computer using simple BASIC commands. Included on this single board are a 32-bit real-time clock, two 16-bit timers/counters, 12-bit analog voltage input and output, eight digital sense inputs, and eight digital control outputs. Self-test software and manuals come with this laboratory interface card designed with serious lab applications in mind. Interactive Microware, Inc.

ADAM & EVE I* ADAM & EVE I is a clever name given to a pair of Apple game paddle controls. They have smooth response and an adjustable trimmer control on each. This trimmer is adjusted with a small key which has screen and wrap around problems when the controls are in use. Each controller is equipped with a switch for firing or for starting; they are sturdy and comfortable to use and responsive in game play. Installation is accomplished by inserting their plug into the game I/O socket in the computer's motherboard. A free adaptor coupon is in the box which contains the controllers. With the large number of IIe computers being sold, it would appear more prudent to include the adaptor with each set of controllers sold. Tech Designs, Inc.

Adams Music Disk* There are nine music players, five graphics display modes, an audio oscillator, note-entry, keyboard player, and three tones-shapes in this program for elementary schools. The programs are "listable," so you can see what is going on and how to use the routines in your program. Richard Adams.

ADC Assembly language mnemonic for ADd contents of specified memory location to the accumulator with Carry. This instruction causes the computer to take the contents of a specified address and the single bit contents of the carry flag in the 6502's status register and add them to the contents of the accumulator. This command is available on the Apple II, Apple II+, and Apple IIe.

ADC Analog to Digital Converter. See A/D.

ADCCP Advanced Data Communication Control Procedures.

Add Characters in Between Existing Characters See Edit Mode.

A/D+D/A* This analog to digital, digital to analog board for your Apple computer offers 8-bit resolution, full scale and zero adjustments, self-test diagnostic software, I/O cable assembly, and more. There are sixteen channels for analog to digital input and sixteen channels for digital to analog output. An operating manual is also included which offers some sample applications for guidance. Mountain Computer, Inc.

Addagram* This simple mailing list program will allow you to store up to 700 entries per disk with add, change and delete features. Allows you to print a selected number of addresses per entry. 48K, disk. Combil.

Adder A processor unit that performs binary arithmetic.

Addey Style Chart The chart on which aspects patterns are based in Harmonics.

Adding* Practice addition aided by graphics. The correct answer produces a happy face. 32K. NTS Software.

Adding Machine* Makes your computer perform like a calculator. Use any of the four basic mathematical instructions for complex calculations. Paul's Electric Computer.

Addition and Subtraction* A program for children that introduces the concept of adding things together. Right On Programs.

Addition Tables* Student chooses the table he wishes to work with. Given ten addition problems, he uses a selected addend and a number from zero to nine as the other addend. 32K. NTS Software.

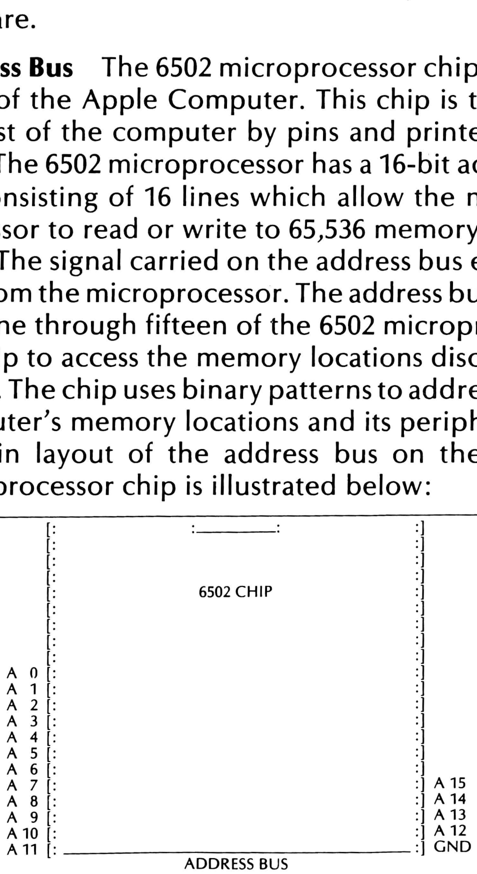
Additional Fonts and Character Sets* Expand The Complete Graphics System II with an additional fifty fonts. Examples of these fonts are Old English, Hebrew, Celtic, Arabic, and computer. 48K. Penguin Software.

Add-On System or circuitry attached to a computer to increase memory or performance. For the Apple these include expansion boards and other devices attached internally or to the various attachment points such as the cassette jack or connectors on the boards.

Address Each memory location in the Apple Computer has a specific address. This address is expressed as a number which allows the computer to find the location and any information which it might contain. Applesoft BASIC uses decimals to express memory addresses and other numbers. The Apple Computer expresses numbers and addresses in hexadecimal form. Memory location addresses on the Apple Computer lie between 0 and 65535 (decimal) and between $0000 and $FFFF (hexadecimal). A number of Memory Map Programs are available which visually display the location of programs, graphic pictures, data, and variables within the computer's random access memory. Many of these programs also print the starting locations and lengths of this information.

Address Book, The* Store up to 700 names per disk with this program that will also format address labels. A user definable category permits you to code in grouping keys for later sorting by category. When used with a Hayes Micromodem, the program becomes an automatic dialer. 48K, disk. Muse Software.

Address Bus The 6502 microprocessor chip is the heart of the Apple Computer. This chip is tied to the rest of the computer by pins and printed circuits. The 6502 microprocessor has a 16-bit address bus consisting of 16 lines which allow the microprocessor to read or write to 65,536 memory locations. The signal carried on the address bus emanates from the microprocessor. The address bus uses pins one through fifteen of the 6502 microprocessor chip to access the memory locations discussed above. The chip uses binary patterns to address the computer's memory locations and its peripherals. The pin layout of the address bus on the 6502 microprocessor chip is illustrated below:



ADDRESS BUS

Address Field In the Apple Disk Operating System (DOS), information is stored on 35 concentric tracks at the center of the disk. These tracks are numbered from 0 at the outer edge of the disk to 34 nearest to the center of the disk. Each track is divided into 16 equal sectors. Each sector holds 256 bytes of data. Tracks are numbered from 0 to 15. An address field and a data field are present in each sector. The address field specifies on which track the disk drive's read/write head is located, and which sector in that track will be passing the head.

Address Modes The Machine language programmer and Assembly language programmer may direct the 6502 microprocessor chip to access computer memory locations in thirteen different ways. Most of these address modes are available to the programmer through the use of the Mini-Assembler. The address modes are listed and described below:

1) Accumulator—This method is only used by four instructions: Accumulator or Memory Shift Left One Bit (ASL), Accumulator or Memory Shift Right One Bit (LSR), Rotate Memory or Accumulator One Bit Left (ROL), and Rotate Memory or Accumulator One Bit Right (ROR). If the instruction contains an A the accumulator is changed. If not, the specified memory location is changed.

2) Immediate—This Address Mode allows the programmer to load a register with a specific number or value, without accessing another memory location. The instruction's operand must be preceded by the pound sign (#). For example, LDA #.

3) Absolute—The process of placing the contents of a specified memory location into another location or into a register. For example, LDY $380 means load the contents of memory location 380 into the Y register.

4) Zero Page—This method uses the absolute mode as described above to access a memory location on the computer's zero page section of memory (its first 256 memory locations). This method of addressing memory uses only two bytes of space, as the high order bit on the zero page always equals zero.

5) Implied—This particular method of addressing memory relies on the op code to supply the address. For example, TAY instructs the computer to transfer the contents of the Accumulator to the Y register. The source and destination address are included in the instruction in this case.

6) Absolute Indirect—This particular mode is only available to the JMP (Jump) instruction. The operand of this instruction must be enclosed in parentheses. When the computer encounters this instruction, it uses the contents of the address specified in the parentheses and the address immediately after the specified address to load the program counter. It uses the high order address from the first location and the low order address from the second location.

7) Absolute Indexed, X—This mode specifies the address to be accessed by adding the value of the contents of the X register to the operand to derive the correct address to be accessed.

8) Absolute Indexed, Y—This mode is the same as the mode just described. However, instead of incrementing by the contents of the X register, it uses the contents of the Y register.

9) Zero Page Indexed, X—This method is similar to Absolute Indexed, X. It requires that the address shown in the operand be an address on the Apple's zero page of memory.

10) Zero Page Indexed, Y—This method is similar to Absolute Indexed, Y. It requires that the address shown in the operand be an address on the Apple's zero page of memory.

11) Indexed Indirect—This method uses the Absolute Indirect method and the Absolute Indexed, X method to access memory locations. The method requires that the operand (designated address) must be on the zero page. The contents of the X register are added to this operand to derive an address which is accessed. When this address is accessed, the computer reads the high order address from the specified location and the low order address from the location immediately following to derive the address to be accessed by the program.

12) Indirect Indexed—This method is similar to the previous method except the indirect address is accessed prior to adding the contents of the Y register. The base address must be a zero page address. The computer accesses it and reads the high order address of the first location and the low order contents of the second location then adds the contents of the Y register to derive the address to be accessed.

13) Relative—This method applies an offset to the program counter to derive the address to be accessed. This offset may be either positive or negative.

Address Notation On the Apple computer, memory addresses are referred to in hexadecimal and decimal notation. In decimal notation, addresses in RAM lie between 0 and 65535. In hexadecimal notation, RAM addresses lie between $0000 and $FFFF. When memory locations are being addressed in the system monitor, they are named as hexadecimal locations. Decimal notation is used frequently in general descriptions of memory and on memory maps to describe what happens where in the computer's memory. The Apple III has 128K of RAM which is described in a similar fashion.

Adhesive Tab Diskette Write-Protection. A diskette is write-protected if it does not have a write-protect notch about one inch down on the right hand side. The notch could be missing altogether (as on the original DOS System Master diskette) or covered over with an adhesive tab. This blocks a small spring-loaded switch or a light beam inside the diskette, and is sensed by DOS diskette driver programs. You cannot change or delete files, reformat or copy a file onto the diskette.

You are allowed to use files, load them, or copy from the write-protected diskette. The purpose of these limitations is to prevent accidental loss of the only copy of programs or data. In most cases the procedure is to copy the write-protected diskette onto a notched diskette, put away the write-protected diskette as a permanent copy, then modify the notched diskette. In some cases you will remove the adhesive tab from the write-protect notch (after thinking it over) and proceed to change the diskette.

It is a good practice to put an adhesive tab (supplied with boxes of diskettes) over the write-protect notch of any important diskette before you use it, unless you need to write data on the diskette.

Adicion en Columnas* As many as four players compete in column addition of one-and two-digit numbers in this Spanish language program. 32K. NTS Software.

Adivina El Numero* Promotes sequencing concepts. Presented in Spanish. The student must guess a number between one and one hundred. Each wrong guess receives a response of "too high" or "too low." Grade level is K-2. 32K. NTS Software.

Administrative Software* A database system for education administration. This is a flexible, easy-to-use system that can handle information on up to 10,000 students, with up to 5,000 information items per student. Types of records are user-definable, and a variety of report formats are available. Information can be edited easily and is readily accessible. Workshops are provided to help implement special applications. Learning Tools, Inc.

Advance One Line on the Printer To space up (advance) one line on the printer without a carriage return, enter BASIC statement:

```
PRINT CHR$(10)
```

or use the "line feed" (LF) button of the printer.

Just PRINT gives a line feed—both space up one line (line feed) and return to left margin (carriage return).

Advance to Top of Page To form feed the printer enter BASIC statement:

```
PRINT CHR$(12)
```

Or use the "top of form" or "form feed" manual control button (FF) on the printer.

You may then need to adjust the paper in the printer so it is actually at the top of a page as defined by the perforations. In a program, you should provide instructions to the operator and a pause (q.v.) to allow paper adjustment.

Advanced Applesoft* A tutorial for users who are proficient in Applesoft BASIC. Areas covered are hi-and lo-res graphics, direct manipulation of memory through PEEK and POKE, error handling, the games controller, and functions. Disk. Little Genius Ltd.

Advanced Coordinates* Determines the position and angle of the planets using five coordinate dimensions: helio-and geocentric, azimuth and altitude, right ascension and declination, and prime vertical coordinates. Matrix Software.

Advanced Data Handler* An updated version of Data Handler* that also has search, label, and add (16.8 digit) capabilities. Full editing and printing abilities. 7K. Business Computer Services Company.

Advanced Dewey Decimal System* A detailed explanation of how the Dewey Decimal System of cataloging works. Using the Sports section, the program demonstrates how various factors determine the way each sport is cataloged. After the demonstration, you play an interactive game based on the information taught. Cassette or disk. Right On Programs.

Advanced Mathematical Routines* A set of mathematical functions for professional use in business, operations management, and research. Math functions provided include linear regression, differential equations, matrix operations, numerical calculus, and more. Equations can be plotted, and data sets can be stored and easily accessed on disk. Serendipity Systems, Inc.

Advanced Package (Coordinates)* A program for exploring five astrological coordinate dimensions: geocentric, heliocentric, right ascension and declination, azimuth and altitude (Horizon), and prime vertical coordinates. Outputs angles plus the listed systems of coordinates. Each coordinate is an alternate way to look at a birth moment in space and time. The program permits various relocation choices like shifted chart angles and shifted local space. The user will also be able to determine the direction of cities and/or astral objects in azimuth. Matrix Software.

Advanced Package (Relocation) Five coordinate dimensions may be used to output angles based on geocentric, heliocentric, azimuth and altitude, ascension and declination, and prime vertical coordinates. Local space and chart angles may be shifted by the user. 16K. Matrix Software.

Advanced Pascal* This tutorial is for the person who has a working knowledge of Pascal fundamentals and wants to progress into the more complex areas of the language. The program introduces the CASE statement, WHILE and REPEAT control structures, boolean variables, and records. Disk. Little Genius Ltd.

Advanced Solunars* An accurate program for managing solar and lunar returns. This program accepts a set of birth information using accurate input routines and computes correct (to the second) sun and moon positions. Correct Delta T increments are built in. Ecliptic true and apparent positions for Sun/Earth and apparent Moon position are given with equatorial equivalents. An indication about the Sun and Moon increasing or decreasing is provided. 32K. Matrix Software.

Advanced X-Tended Editor (AXE)* A text editor extension to the standard Applesoft editor. Uses include: statement insert and delete, enhanced cursor movement, two packed list edit modes, recall editing modes, auto line numbering, resident BASIC program, full character insert, gobble, and delete. 48K RAM; DOS 3.2. Versa Computing, Inc.

Adventure Creator* This tutorial can help you learn how to create your own games with hi-res graphics, text, and sounds. 48K. W. Helm.

ADWAR ARS 170A* Generate high-resolution color graphics with this board. NTSC standards are supported to make your system suitable for broadcasting. Adwar Video.

A.E.N. Grading System* Let your computer system be your gradebook. Record students' grades, and the program alphabetizes and makes all necessary calculations. It handles number- or letter-grades, generates various reports, and includes good instructional material on use of the system. Avant-Garde Creations.

Aestheometry—Volume 1* Introduces and demonstrates the space concepts of elliptical, parabolic, and hyperbolic curves. Minnesota Educational Computing Consortium.

Aexpr BASIC programming abbreviation for arithmetic expression used to illustrate mathematical operations in programs.

Agency Data Management System, The* Developed for life insurance agents' record keeping needs. Features pfs: File and pfs: Report. Vernon Tech Corp.

Agenda Files* A flexible calendar filing and reminder system that is easy to use and will keep you up-to-date until the twenty-first century. It allows you to rapidly access and print out information, keep a file of tentative plans, generate lists of "things to do," phone numbers, clients, etc., and specify the time in advance that you'd like to be reminded of an upcoming event. 48K; Applesoft BASIC, disk. Apple Computer Company.

Ag-Nalysis* A software package that includes eleven programs for analysing and increasing profit margins in agricultural applications. Cattle Inventory; Dairy Rations; Livestock Profitability Analysis; Economics of Feeders; Economics of Crop Production; Yield per Acre; Cow/Calf Profitability; Market Weight Analysis; Farm Buying Financial Checklist; Quarterly Cash Flow; and a net worth Financial Statement. A second disk is also included with information for determining the most profitable mixture and amount of feed for cattle and heifers of differing weights. Disk. Micro Ag.

Agri—Ledger An excellent farm-oriented double entry accounting system that is menu-driven and includes a comprehensive, well-written manual and four disks. Nearly all aspects of the program are user-defined. Records can be kept for only one farm or twenty-nine different enterprises, if you wish.

The program provides seventeen report titles and reports are available on a monthly, quarterly, or yearly basis. As a farm accounting system, Agri-Ledger is well designed. The documentation is simple yet thorough. Because the program uses a double entry system of accounting, it requires extra time and effort. Also, you may encounter difficulty in setting up or changing account codes. Overall, through, this is a fine software package. Small Business Computer Systems, Inc.

Agricalc* A series of electronic worksheets for use on the farm and at home. The Depreciation Worksheet allows the user to calculate the best method of depreciation for equipment, calculated over as many as 25 years. The Agricultural Cost Analysis Worksheet helps structure information regarding per acre production costs versus historical yield per acre. This allows the farmer to determine whether incurred costs will be covered by earned profit. The Financial Statement Worksheet lets you record all the information necessary to produce a balance sheet, reflecting the financial status of your farm. The Personal Budget Worksheet is for creating a home budget. The Cash Flow Worksheet allows estimation of cash flow requirements and aids in planning to alleviate cash flow problems. The Checking Account Worksheet automatically updates expense totals by category and will generate year-to-date and current profit and loss statements. Also included are an Interest Calculation Worksheet, a Loan Schedules Worksheet, a Vehicle Data Worksheet, a Recipe Worksheet, and a Commodities Worksheet. Computerland (Grand Forks).

Agriculture and Farming Software See Ag-Nalysis; Agricalc; AgriLedger; Beef Feeder Projection; Beef Feedlot Records and Analysis; Budget Analysis; Budgeting Systems; Calf Production Records; Cash Crop Projection; Cattle Feeding Economics; Coexist-Population Dynamics; Commercial Cattle Feeding Program; Compulize System; Computerized Farm Accounting System (CFAS); Computerized Farm Records; Corn Harvest Losses; Corn vs. an Alternate Crop; Cow/Calf Profitability; Crop History; Crop Management Package; Crop Production; Crop Yields; Dairy Enterprize Analysis System; Dairy Herd Management System; Day Adjusted Weaning Weights; Economics of Corn Production; Farm Management Decisions; Farm Records; Feeder; Feeder Pig Production; Fertilizer Formulation; Fertilizer Recommendation Package; Field & Crop Records System; Field Population; Field Size; Hog Farrowing Projection; Least Cost Ratio Formulation; Liquid Manure and Fertilizer; Livestock Breakeven Analysis; Machinery Management Series One; Net Energy for Feedlot Cattle; Protein Balancing for Feedlot Cattle; Seed Corn Dealer's System; Selling Wet Corn vs. Dry; Sheep Production Economics; Soil Test Recommendation; Swine Enterprise Analysis System; Swine Management System; Swine Ratio Anlaysis; VisiCalc Agri-Data; 205 Day Adjusted Weaning Weights.

AIDA: Apple Interactive Data Analysis* A package for statistical analysis designed for use in commercial, social science, and marketing research environments. Included are powerful statistics capabilities, regression functions, and time lag transformations. You can analyze subsets of data, and the system allows you to work with up to 4,000 cases, or 11,000 data points in memory at once. Action-Research Northwest.

AIO Serial & Parallel Apple Interface* Lets you interface your computer with printers, terminals, plotters, modems, and other computers. Features include one RS-232 serial interface and two bidirectional 8-bit parallel ports. Includes cable assemblies, comprehensive user's manual, and onboard firmware. SSM Microcomputer Products.

AIO-II (Serial & Parallel Interface)* Plug this board into any slot between one and seven of your computer, and you have a complete input/output control for your Apple. Some of the many features are two full function programmable parallel ports, true simultaneous output to serial and parallel devices, one programmable RS-232 serial interface with full handshaking, and supports for a wide range of printers. SSM Microcomputer Products.

AI02 Analog Input System* This card provides sixteen-channel analog data acquisition. Channels are software addressable with 8-bit resolution. Conversion takes place rapidly, so a wide range of applications can be used. There are no external power requirements. Interactive Structures.

AI02-HS Humidity Sensing Module* A complete system that monitors humidity. It can be mounted in any position as long as it is protected from physical abuse. Software is provided to convert binary input from the sensor to relative humidity. Interactive Structures.

AI02-VS Voice Sensor* This system plugs into the AI02 or AI13 analog input card. It will enable the user to have computerized music, a digital echo chamber, voice recognition, and a variety of other applications which use an audio signal digitized by the computer. Interactive Structures.

Air Conditioning Calculations* Uses R and air change heat transfer factors to determine heat gain in BTUs and tons. May be used for modeling air conditioning requirements. Disk. Utilities Engineering.

Air Navigation Trainer (ANT)* A flying simulator for students. Experienced pilots will be able to work on their instrument training as well as practice holding patterns on a VOR or NDB fix while looking at wind effects on the ground. Includes four pre-programmed simulations, sound effects, and hi-res graphics. 48K. Space-Time Associates.

Aircraft Instrument IFR Simulator* A pilot training package. 48K. Programmers Software Exchange.

AirSim-Flight Simulator* A very realistic flight simulator. Using equations of motions that guide actual planes, it will even perform aerobatics. You will be treated to three-dimensional scenery that shows the New England coastline from Boston to New York City, and includes a horizon one hundred miles away. A training field is included to help you to learn how to land! Teaches you to operate instruments such as the articifical horizon and the horizontal-situation indicator, which will enable you to make VOR-guided landing approaches on instruments. 48K. Mind Systems Corp.

AKBI Apple Prototyping Board* Maximum flexibility is achieved through uncommitted hole configuration on this prototyping board for the Apple computer. Bread boarding of high performance or high frequency circuitry is provided with a ground plane for shielding. SSM Microcomputer Products.

Alcohol* A fun and informative program that can educate the user about the effects of drinking and alcohol level on your health and behavior. Creative Computing.

Alcohol & Health* The many reasons for and effects of alcoholism are covered in these eleven lessons. Seventh graders and up may study the many hazards of drinking. 48K RAM; disk. VMI Visual Materials, Inc.

Algebra Drill and Practice* A supplement for a student presently taking an algebra course. Some of the drills include a level with hints. The areas of drill are: working with algebraic fractions, working with numeric fractions, simplifying algebraic expressions, finding slopes and equations of lines, practice with signed numbers and with order of arithmetic, and working with percents. 48K; DOS 3.2.1 and DOS 3.3, disk. Conduit.

Algebra I* The material in this program is usually considered pre-Algebra in eighth-grade math. It does, however, establish a good foundation for Algebra. There are five study areas: 1) definitions; 2)number line operations; 3) sets; 4) rules for equation reduction; 5) evaluating expressions. A menu selection allows the student to choose from four different learning methods: definition, rule, example, and sample problems. There is a final test of all the material in the program. 48K. Edu-ware.

ALGOL ALGOrithmic Language. A high-level programming language designed in the 1960s for the concise expression of arithmetic and logical processes.

Algorithm An algorithm is a statement or series of statements which define the fashion in which a problem will be solved. It defines the variables and constants to be dealt with and the way they interrelate mathematically. An entire program written for a computer to solve a particular problem may be an algorithm. A specific series of program steps which presents, collects, or manipulates data may also be an algorithm.

Alicia—A Bilingual Reader* Using a word-by-word testing method with a hi-res screen alphabet, you study a Spanish translation of "Alice in Wonderland." 48K. George Earl.

ALIS Graphics System* ALIS Graphics System is a Graphics plotting utility for the Apple II+, and Apple IIe (in 40 column mode) computer. The program comes with a complete but brief manual which describes each system command in detail and provides a Tutorial adequate to teach the novice how to use the program. The ALIS Graphics System can be used to draw line graphs and bar graphs, and to plot points. Line graphs and bar graphs may be combined. Titles and subtitles may also be displayed. Tic markers and grid lines make the graphs easier to use.

Data to be used in the graphs may be input from the keyboard in a long form (each point entered by the user) or in short form (each point generated by the program after the user provides the starting point) with the number of points to be plotted, and the increment between points. Data may also be loaded from disk in a text file; the program has a utility to convert files to an acceptable format. As many as six graphs may be combined in a single graph. Hard copy of lists of data and graphs may be printed if the user has a Grappler or PKASO interface card. Graphs and data files can be saved to disk. A graph, once saved, may be loaded into the system with a graphics utility program such as The Printographer or Zoom Graphics, and then printed to any printer compatible with these programs.

ALIS Graphics System is easy to learn and easy to use. Its power is increased by its ability to use formulas to generate data points from previously entered data. The quality of the graph produced is excellent. The character sets used for various displays are pleasing. This graphics program is useful to people who don't want to take a long time to learn a complicated program, but who want a powerful graphics system. Eco-tech, Inc.

Allocation of Space Assigning particular areas of memory (internal, diskette, etc.) to particular files, programs, or functions. Allocation is sometimes done by a programmer, sometimes automatically by a program, such as DOS.

Almanac* Performs time related functions such as displaying the current time for a range of time zones around the world; projecting sunrise and sunset times; generating calendar pages for any month past or future; calculating the moon's phases, eclipses, and rise and set times. It also includes a planetary orbit simulation that shows the planets' locations in relation to each other for any time past or future. 32K; disk. Tape'n Text-Williamsville Pub.

Almanac* A program for those interested in time, calendars, and general astronomy. Functions include sidereal time, sunrise and sunset calculations, solar system model, a real-time clock, and calendar calculations. Recommended for businessmen, novice astronomers, shortwave radiohackers, and time travelers. Computing Concepts.

Alop BASIC programming abbreviation for arithmetic logical operator. These are:

AND
OR
=
>
<
≠
≥
≤

Alpha and Beta Test Sites A test site helps the originators of a hardware or software product test it in a real-world situation.

Alpha test usually involves only a very few companies or individuals who realize that the product is incomplete or may have flaws. Alpha testers often work for the originating company, or are otherwise closely related.

Beta test sites are generally larger in number. They expect that the product is essentially complete and correct, and test it in a real-world production situation. If errors are discovered, the originators ordinarily attempt to fix them rapidly so the Beta sites can stay "on the air" with the new product. If numerous or serious bugs are found, the product may have to go back to alpha testing until an improved version can be presented for another round of Beta testing.

ALPHA LOCK The Apple IIe and Apple III computer keyboards are equipped with a key which locks into the down position. It causes all alpha characters which are pressed to be displayed and to be recorded in memory as capital letters. On the Apple III computer, this key is called the ALPHA LOCK key. On the Apple IIe, it is called the CAPS LOCK key. To revert to shift key control of capitalization, this key must be returned to the up position.

Alpha Plot* Allows you to make color drawings and charts, type in upper and lower case with proportional spacing, and do many manipulations with the images on the screen. Beagle Bros. Micro Software.

Alpha Syntauri* A musical instrument with easy-to-use hardware and modular, flexible software. The system lets you control note percussion, vibrato, sustain, envelope, octave range, tone qualities, and timbre. You can store over 7,000 notes in RAM in an average record/playback period. 48K. Color monitor, two Apple Music Synthesizer boards (ALF), a stereo or mono amplifier, and speakers. Syntauri.

Alpha 2* A music synthesizer with a reasonable price. Includes an audio output cable, circuit card, nine almost identical channels, and a convenient method of entering songs. Disk or cassette. Syntauri.

Alphabetize* Gives the elementary school student an opportunity to increase word skills. Helps with spelling, word recognition, and sorting. 48K RAM; disk. Fullmer Associates.

Alphabytes* Increase the text capability of the Executive Briefing System, a business graphics package. Contains twenty-four fonts, black and white and color disks, three families of text style, and eight different sizes. Offers companies a way to develop slide shows and successfully sell products. Lotus.

Alphanumeric Character A set composed of all alphabetic and numeric characters, used in situations where program input will accept either alpha characters (letters) or numeric characters (numbers). In those cases the character is treated as alpha regardless of its nature, and it is not used for mathematical operations. Example:

1955 Franklin Street

Altcharset The Apple IIe computer is equipped with two character sets in ROM. The user can toggle to the alternate character set in a BASIC program by using POKE 49167,0 to turn the character set on and POKE 49166,0 to turn it off. In Machine language, he would use $C00F to turn it on and $C00E to turn it off. The primary character set on the Apple IIe can display upper case characters in normal, flashing, and inverse mode. The alternate character set can display both upper case and lower case characters in the normal and inverse modes, but can display neither in flashing mode.

Alterable Memory Storage media, such as a diskette or cassette, which can be written onto or changed.

Alternating Current Any signal not constant is considered alternating current; however, this term usually means that the current changes polarity during time.

ALTZP Soft Switch Auxiliary Stack and Zero Page Soft Switch. When this switch is on, the computer reads from, and may write to, RAM located in the zero page of the computer's memory.

ALU See Arithmetic Logic Unit.

AMD—The Assistant Music Director* Series of programs featuring Music Scheduler, a music selection planner; Format, a color graphic clock for planning music; Sequence, a music formatter; and Request, which maintains information on telephone requests. Helps a busy music director keep a flexible and interesting play list. Media Service Concepts.

Amdek Monitors* The following monitors are arranged in order of price:

12″ B/W model 100. Handy size, good display, and fine for 80-column display.

12″ green model 300. Same as above, but green-phosphor.

13″ color model I. Good color, not recommended for 80-column display.

13″ color model II. Excellent high-resolution, can be used for 80-column display. Amdek.

A.M.P.* Combined with any memory expansion card, A.M.P. will automatically provide thirty percent more memory. Micro-Sparc, Inc.

Amper-Array* See Array.

Amper-Chart* See & Chart.

Ampere Measurement of electrical current: the actual number of electrons moving past a stated point per second.

Amper-Interpreter Utilities* Uses the Ampersand to emulate the PRINT...USING statement for formatting numeric printing. Links are also provided to clear screen, clear page, clear error, bell, and execute ON ERR statements. Nibble.

Ampersand (&) The ampersand is a token for a CALL to locations 1013 to 1015. These memory locations hold the JMP (see Hexadecimal) instructions for a subroutine indicated by the argument following the & symbol. A common use is in the REnumber (q.v.) routine from the System Master, where the REnumber routine is loaded above HIMEM (q.v.) and its address is stored at 1013-1015. When you wish to renumber your program lines, you enter &, and the subroutine is executed, using either the default values, or those which you have specified for F, I, S, and E. The ampersand vector is used for many different routines, but only one such routine at a time may be present in memory. See also Array, Amper-Chart, Amper-Screen.

Amper-Screen* Another set of utility routines designed to be used along with the Routine Machine package, this set allows you to do many interesting things with a text screen display. The routines include Input Using, Edit String, Lower Case Input (primarily of interest to those who have modified their Apple II/II+ with a lowercase chip—otherwise the screen display will be garbage), Singing Keys, Print Repeat (to print a specified string a given number of times), Speed Control, Print Pause, Window, Clear Screen, Cursor Mouse (an interesting way to use joystick or paddles to simulate the Apple Lisa Mouse!), Scroller, and Scroll 4X. Scroller will allow you to have a message move across your screen as if it were in Times Square; Scrol 4X moves the entire screen in any direction you specify, and can be used with low-resolution graphics as well as text. A reasonable amount of study and practice is required to make all these ampersand utilities work properly, but the results are worth the time. Southwestern Data Systems.

Amper-Search* A high-speed Machine language routine, for use with an Applesoft Firmware Card or Language Card, which can search 2,000 elements of an array in less than one second for the first occurrence (or all occurrences) of a specified character string. The matching elements' subscripts are returned in an array and parameters are passed to: 1) name the string array and the variables to receive the matching subscripts; 2) define the character string and the search bounds; 3) find the number of matches. Alan G. Hill Software.

Ampersoft* A group of utilities to improve Applesoft BASIC and the disk operating system. Some of the BASIC commands have enhanced functions. An added feature includes the ability to increase usable memory by transferring the DOS to RAM, and freeing up to 10,000 bytes. Nibble/Micro-Sparc Industries.

Amper-Sort/Merge A utility that performs sort/-merge functions on DOS text files. It is written in Machine language for speed, and works with most database files that set up DOS 3.3 text files. Requires 48K; ROM card or language card. Alan G. Hill.

Amplifier A device or circuit that increases the power or strength of a signal.

Ana I* This general plotting package does statistical analysis of stock data. 48K. Galaxy.

Anadex (Model 9501) Graphics Software* An Assembly language hi-res dump that helps you use the full capabilities of the 9501. Computer Stations, Inc.

Añadiendo* A Spanish language programming graphics to teach simple addition. NTS Software.

ANAI* Weekly averages for stocks on the Dow Jones Industrial Index from as long ago as 1897 can be used as data for analyses spanning six months to five years. Results are plotted in high-resolution, color graphic displays that can be routed to a printer. Analyses performed include moving average, best straight line, or any other user-defined routine. Updates to the DJI weekly data file may be accomplished using an included auxilliary program. 48K. Galaxy.

Analog Having a continous range of voltage or current values. Contrast with digital.

Analyser/Analyzer Any device that checks or regulates a component, board, or system, and presents the data for review.

Analysis 1* This program lets you analyze and plot Dow Jones Industrial data on your computer screen in a variety of hi-res colors. Features user specified moving averages; filters for time, magnitude, or percentage changes; and user created relationships between the DJI data, a transform, or a constant using +,-,*,/ operators. 48K. Galaxy.

Analyzer, The* A multi-faceted business analysis package that produces analytical reports on your balance sheets, profit and loss statements, budgets, sources and uses of funds, financial ratios, and cash flow projections. The system is menu-driven and convenient to use. 48K; 2 disk drives, Controller 1.1. Dakin5 Corporation.

Anatomy Quiz* Test your knowledge in human anatomy during the course of this seven volume study. Questions on muscles, veins, nerves, and joints are in multiple choice and matching format. 48K. Professional Computer Systems.

AND Term for a logical procedure defined by the rule: If A AND B are 1, then C is 1, otherwise C is 0. The AND of 10110111 and 10000100 is 1000100. For logical situations such as the conditional test in an IF statement, substitute TRUE for 1 and FALSE for 0. Example:

```
30 IF A$ = “Y” AND A > 100 GO TO 40
40 PRINT “A = ”; A
```

Annual Report Analyzer* Profiles stock performance over a five year time span. United Software of America.

Annunciator One of four one-bit outputs which act as input signals for other electronic devices. Annunciator outputs can drive lamps, relays, speakers, and similar devices. Annunciators are controlled by soft switches arranged in pairs. The first of the pair turns the annunciator “off.” The addresses of the annunciator soft switches can be found in the *Apple II Reference Manual.* All of the annunciator outputs leave the computer via pins AN 0 through AN 3 in the game Input/Output (I/O) connector.

Annunciator Special Locations *The Apple II Reference Manual* supplies the following Table of Annunciator Special Locations:

AN	STATE	DEC	ADD	HEX
0	ON	49440	-16296	$C058
	OFF	49241	-16295	$C059
1	ON	49242	-16294	$C05A
	OFF	49243	-16293	$C05B
2	ON	49244	-16292	$C05C
	OFF	49245	-16291	$C05D
3	ON	49246	-16290	$C05E
	OFF	49247	-16289	$C05F

AN=Annunciator; STATE=State; DEC=Decimal; ADD=Address.

Anova* A statistical package that includes treatment means and standard deviations, analysis of variance, balanced designs, and more. This system allows up to 1,400 data points with 48K memory, handles input from disk or keyboard, gives video or printer output, and enables you to create data files. Human Systems Dynamics.

ANSI American National Standards Institute.

Answering Machine* An answering machine that can do the following: answers your modem phone line with your name, takes and gives messages, lets you pick up messages or exit from program to BASIC from a remote terminal; shows or prints a detailed system log, and offers a sophisticated security routine. It also will work with clocks. Telephone Software Connection.

Antfarm* A program designed to teach programming skills to children and adults in an enjoyable format. Structured programming and top-down design are emphasized. Here's how it works. An antfarm is drawn on the screen, and the user must tell the ant what to do to stay alive (plant a garden, eat something). Built-in commands are displayed, and figuring out which command to use offers a novel and fun approach to learning good programming style. Basic knowledge of how computers work in helpful. New commands can be presented and then saved to the disk or printer. 48K ROM; Printer optional; disk. Wims Computer Consulting.

Any Key Down Some programs look for any key on the keyboard to be pressed before continuing to another program step. The program must read memory location 49168 ($C010 Hex) to see if the high order bit is set to 1. Any time the memory location is read, this bit is cleared (set equal to 0). This location is called the keyboard strobe bit. It is set (changed to 1) any time a key is pressed.

Anyone Can* A self-paced computer course in BASIC that allows each student to progress at his own pace by keeping track of each individual separately. Students can concentrate on learning large subject areas such as graphics or individual commands. The computer's record of their progress determines the depth of study required. 48K; DOS 3.3. Pear Software.

AO-03 Analog Output System* Provides eight independent channels for controlling analog-output applications. Each channel is digitally latched with 8-bit precision, and is accurate to ½ LSB. The standard positive voltage range may be changed to a bipolar range. A typical application for this system would be for writing and producing music. Interactive Structures.

AOP Abbreviation for Arithmetic OPeration when used in generic descriptions of mathematical formulas or program listings.

Apartment Manager* Maintains up to sixteen categories of data for 120 units in as many as six different locations. This Machine language and Applesoft II program will perform searches, sorts, and edits, and maintains rent receipt, utility, and other expense records. Disk. Software Technology for Computers.

Apartment Management Program* This program will manage receipts, expense records, and other records and statements, for up to six apartment complexes with a total of no more than 130 units in all. Disk. Realty Software.

Apartment Manager Program* This program creates reports for YTD, MTD, and rent receipts. Managers can keep track of information on various complexes and units. The operation is turnkey, and requires a 132-column printer. Disk. Software Tech for Computers.

APEX* This is a Disk Operating System for the Apple system which includes utility programs and twenty-three operating commands. 48K. The 6502 Program Exchange.

Apio Parallel Interface Card* A parallel interface with two bi-directional 8-bit ports, four additional interrupt and handshaking lines, dual connectors, and software-run interface configuration and data direction. Also includes on-board firmware for a Centronics-type printer and a jumper option to utilize 2112-type RAM in place of PROM. SSM Microcomputer Products.

APL A Programming Language (APL) invented by Kenneth Iverson. It is used for algorithmic interactive programming.

APM* CPM (Critical Path Management) for the Apple designed for production planning on a large scale. Up to 2,000 tasks can be correlated into interrelated jobs. The program computes the deadlines that are to be met to finish your work on schedule. Features report generation, an interactive alternative to timesharing, and real-date calendar parameters (month/year project start and finish dates and working/non-working days in the week). Also includes the ability to edit and update networks on a regular basis. 48K; 132- or 80-column printer, Applesoft BASIC, disk. Apple Computer, Inc.

APMOD* Read temperature, light levels, and appliances with this low-cost data acquisition card. It plugs into any of the slots of your Apple computer to provide a MVDAC Systems port. Connecticut Microcomputer.

Append To add to the end of a character string or list.

APPEND A DOS command which allows the user to add data to the end of a sequential text file. This command also allows access to any information from any particular field in a text file. The command opens the file and sets the "position-in-the-file" pointer to the byte which lies one byte beyond the final character in the file. The Append command must be followed by a WRITE command.

APPILOT II Edu-Disk* This is an expansion of Apple II PILOT which adds hi- and low-res graphics, timer, mixed graphics and text, a light pen input for the Symtec light pen, and voice capabilities using the Muse Voice program. 48K. Muse Software.

Apple Access III* Expand your communication horizons. Access III can link up with remote information services, mainframe or minicomputers, data bases, etc. It is an interface between the Apple III and other information access for easier work scheduling at your own pace. Download data to the Apple and work on it off line to avoid timesharing costs. Apple Computer, Inc.

Apple Aids* A package of twelve utilities to improve the Apple's operation. Among the useful aids are sector data file editing, system disk conversion to data, improved directory functions, sector usage mapped for inspection, and more. Advanced Operating Systems.

Apple Alarm* A guarding system that warns you about intruders, smoke, fire, movement, and moisture. Attach it to your floor mat and door switch, and the Apple will be ready to sound off an alarm. It will also count the time from the moment it was triggered, so you can tell when the kids come home, or when the evening janitor arrives. A twelve page manual is included. 32K RAM. Andent.

Apple A.L.D.S.* Assembly Language Development System allows programming in three different assembly languages: Z-80, 8080, and 6502. All three languages can be within one program. Includes macro capability, relocatability, conditional assembly, a 6502 debugger, and a program to facilitate transfer of CP/M files to Apple DOS. Microsoft Consumer Products.

Apple AP PAK* This is a hardware/software application package which contains an AUTO PLOT printer control card, interface cable, software, and instruction manuals. Utilizes all the graphic capabilities of your 99 graphics printer. An unlimited number of character fonts, large headlines, intermixed type fonts on a line, and many more features. Micro Peripherals, Inc.

Apple Assembly Language Training Materials* A resource of training materials for an course in Apple Assembly language. Through an animation of the 6502 chip, the package demonstrates each instruction's operation. The Mini-Assembler and Editor-Assembler by Apple Computer are included as part of the package. 32K; disk. Minnesota Education Computing Consortium.

Apple BASIC for Business for the Apple II*. By Alan J. Parker and John F. Stewart. Primarily a college text; while there are problems at the end of most chapters, there are no answers included. They are available in an instructor's manual. The primary emphasis is on business applications, so the use of files is introduced as early as the fourth chapter. Both sequential and random access (the text calls them direct access) files are taught, with all the types of manipulations needed in an office. A previous knowledge of BASIC is helpful, although some of the commands/statements are given in the third chapter, and a summary of BASIC commands and instructions is given in the first appendix. Reading level grade 7.5. Reston Publishing Co.

Apple Bulletin Board System/ABBS* A program that implements a computer based message storage and retrieval system on a 32K or bigger Apple II. Mechanically answers calls, automatically determining the transmission speed of the terminal or computer on the other end. After the caller identifies himself, he can read or write messages on the bulletin board. When this cycle is completed, the caller hangs up and the ABBS prepares itself to receive another call. Micro Software Systems.

Apple Business BASIC* A powerful BASIC language that can handle major business and scientific programs with the Apple III. It has one of the largest work areas available (70K) for personal computers. A number of accounting and business features are included such as flexible report writing, calculations accurate "to the penny", efficient file storage, simultaneous multiple file, easy file read/write with fast peripheral access, and programming aid for more structured BASIC listings. Apple Computer, Inc.

Apple Cat II* A top-of-the-line direct-connect modem that also is a total personal communication system. Access data banks, exchange programs, and carry on a conversation with your office computer easily, logically, and simply. Some automatic features are automatic dial, answer, and disconnect. Apple Cat II organizes computer memory so that you can hold incoming messages and store outgoing messages until they are ready to be sent. The Serial RS-232 port is built in with handshaking for running your printer. A BSR controller connects to your home wiring so that, with the help of a clock, you can use the Apple II to run your appliances. Novation, Inc.

Apple Cider Spider* Apple Cider Spider is an arcade style game with high-resolution graphics. It requires 48K of RAM and DOS 3.3 to run on the Apple II and Apple II+ computers. The program runs well on the Apple IIe computer with a DOS 3.3 disk drive. The player uses a joystick or the keyboard to control the actions of a spider on its way through the pitfalls of a Cider Mill. The spider must jump over a number of spaces between shelves or pieces of machinery and climb up or down webs until it reaches its web high in the rafters. The game action is smooth as the player guides his spider over obstacles, avoids falling apple pieces, rivers of cider, and the mutilating machinery of the Cider Mill. The game has sound which can be toggled on and off by the player. The I, J, K, and L keys are used to maneuver the spider from the keyboard. Pressing the space bar causes the spider to jump. The ESCAPE key may be used to freeze a game in progress and to restart the game when the player returns from some interruption. Players may choose progressively harder levels of play as they become more adept at the game. 1 or 2 players. Sierra On-Line, Inc.

Apple Clock, The* This real-time clock for your Apple will keep accurate time for over one year (needs to be set every 388 days). Software-controlled interrupts, on-board battery in case of power outages, and more. Mountain Computer, Inc.

Apple Concordance* A program development utility that prepares lists defining where your program variables are used and how they are referenced, as well as a cross-reference of line numbers and where they are used. Nibble.

Apple Cooling Fan* Keep your Apple cool with a fan that circulates cooling air across ICs. Available in 115 volt AC or 220. M & R Engineering Company.

Apple-Crypt* Protect your software and hardware with secret coding that only you know. The utility places cryptic coding on the data written to a disk with a DOS 3.3 format. Computer Applications, Inc.

Apple Data-Graph 2.1* A maximum of 120 data items may be plotted on any of three superimposed curves. Each graph has x and y axes and may be stored, recalled, or updated. 48K; disk. Connecticut Information Systems Co.

Apple Dialog* This program is designed to help orient the novice Apple user to the keyboard. Indian Head Software.

Apple Disk Fixer* A tool kit for manipulating, repairing, and protecting your valuable disks. The full screen editor helps you examine and work on any portion of a disk, even lock out bad tracks to keep your disk usable. 13- or 16-sector disk. Image Products, Inc.

Apple Doctor* This utility will test your Apple II's condition and advise you as to whether it needs servicing. The parts checked include Applesoft card, ROMs, disk drives, tape storage system, all RAM chips, video display system, printer cards, RS-232 communications card, and disk write-protection hardware. Disk. Soft Control Systems.

Apple Electric Mouth* Your Apple computer will become a talking computer in just minutes with this easy-to-install board. It comes with 143 supplied words and is capable of producing hundreds more. Additional speech ROMs can be added to allow a vocabulary of thousands of words and phrases. This package comes with complete instructions and examples, using actual BASIC and Assembly Language programs. Netronics R&D Ltd.

Apple Firmware Card* A plug-in board which enables the Apple II (with Integer BASIC resident in ROM) to be converted to an Apple II+ runalike. It substitutes ROMs with Applesoft BASIC (floating point) for those on the computer's mother board. Once the board is plugged into any empty slot on the main board, the board's switch is turned to the up position, and the reset button is pressed and released.

Apple Flash* Test young students' ability to perceive letters, numbers, symbols, and shapes. The images flash on the screen at various speeds in combinations set by the teacher or parent. Nibble.

Apple Flasher* Files are transformed into hi-res images in approximately one and a half seconds. Features display modes which allow single-key selection, recurrent scanning of files, and rotating projector simulation. Disk. Crow Ridge Associates.

Apple FORTH 1.7* This FORTH Interest Group compatible nucleus allows user definition of operations to build a unique library of functions. Includes a screen editor, a decompiler, and a utility for developing software. With a built-in operating system, FORTH is about ten times faster than Integer BASIC. 48K. Captain Software.

Apple FORTRAN* This language is useful for scientific, engineering, and mathematics applications. It has been available for a long time with mainframes, and is now available for the microcomputer. Use this powerful language to modify existing programs or create new ones. Apple Computer, Inc.

Apple Gradebook* Designed as a teachers' aid, this program keeps records of students, individual grades, statistics, and more. Disk. Creative Computing.

Apple Graphics Games* By Paul Coletta. The book begins with an explanation of shape tables, surely one of the more abstruse concepts in the Apple world, and continues with sound generation routines and an alpha-numeric character set. You then are shown how to develop a menu which will access any of the games found later in the book. The reading level grade is 9.5. The games are fully listed in the text so that you can key them in. An optional diskette written in Applesoft BASIC contains all the games in the book. Reston Publishing Co.

Apple Graphics & Arcade Game Design* Written by Jeffrey Stanton. Here's a great way to learn how to design graphics and arcade game structures. You'll learn Apple hi-res graphics from BASIC and Machine language, how to speed up your graphics, raster graphics and bit-mapping techniques, and the theory of designing playable games. Thorough knowledge of BASIC programming on the Apple II is a pre-requisite. (An accompanying disk of the program code discussed by Mr. Stanton is also available.) The Book Company.

Apple IEEE-488 Interface* With this interface card, the Apple computer can operate as IEEE-488 bus controllers. Character-string instrument commands for set-up, clear, measure, local, trigger, serial-poll, and respond function are used to allow bus and system control. Software timing loops are not needed and error checking with bus timeout is included. SSM Microcomputer Products.

Apple Keys The keyboard of the Apple IIe and Apple III computers are equipped with two keys which bear Apple symbols. One of these keys is marked with an open (unfilled) Apple. The other is marked with a closed (filled) Apple.

On the Apple III computer, these keys are used to provide added uses to normal keys. The closed Apple key increases the speed of repeating of the key pressed along with this key from 11 characters per second to 33 characters per second. The open Apple key, when pressed with the space bar, removes all characters passed over by the cursor from the display and from the computer's memory.

On the Apple IIe these keys are used with the RESET key to trigger special diagnostic tests and to perform special system RESETs. These keys are also tied to game paddle switch memory locations which may cause some older Apple II games to function incorrectly unless a shift key modification is made to the Apple IIe.

The open Apple key can be used with the RESET key to force the cold start of a program in memory even though the computer is on. This saves wear and tear on the power switch and is a convenient means for the user to restart the program. If the open Apple key is held down alone, it forces a restart of the computer and destroys any program in memory. The closed Apple key will run a diagnostic test of the computer's circuits when it is pressed along with the RESET key and the CONTROL key. This diagnostic tests RAM memory by writing to each location and reading from each location. This process will destroy any data in the memory when the diagnostic is initiated. Once the diagnostic is completed and an "OK" message appears on the screen, the computer can be restarted by performing a normal RESET. If an error message is displayed, turn the computer off for a short time, then turn it on and rerun the diagnostic test. If the error message persists, the manufacturer recommends that the computer be taken to an authorized dealer for service.

Apple Language Card* A 16K RAM expansion card which plugs into Slot 0 of the Apple II and II+ motherboard. This plug-in board expands the maximum RAM capacity of 48K to 64K. It is called the Language Card because it allows such languages as Pascal and Integer BASIC or Applesoft BASIC to be loaded into, and be used by, the computer. See RAM Expansion Cards and Disk Drive Emulators. Apple Computer, Inc.

Apple Literature Database* A collection of Apple literature from the past five years contained in a database. By using key word search you can review over 60 publications. 48K RAM, ROM; disk. Connecticut Information Systems.

Apple Locker* Prevent the theft of your precious Apple computer with this simple-to-install anti-theft system. It connects your Apple and any three peripheral devices together with a strong steel cable. The cable locks onto the Apple and the other end is bolted to a strong heavy object. Tele-Terminals, Inc.

Apple LOGO* LOGO is a language designed to make using and programming the computer as easy as possible. It is a non-threatening introduction to computers and computing, which emphasizes good programming techniques and logical problem solving. Apple Computer, Inc.

Apple Logo Primer* By Gary G. Bitter and Nancy Ralph Watson. The book is spiral-bound so that it lies flat for easier use during the learning process, which is of great help to someone who only has two hands, both of which are needed on the keyboard (users with more than two hands may still find this feature useful). The first section is a tutorial, almost complete, for someone who has never used LOGO before, and consists of fourteen chapters moving from Turtle Graphics, through procedures, REPEAT function, editing, recursive programs, input and variables, arithmetic operations, conditionals, animation, text, and combined text and graphics.

In the quick-start second section are the directions for someone who has used another version of LOGO and wishes to become familiar with Apple LOGO in the least amount of time. The third section, entitled "Applications," discusses the major versions of LOGO. Appendices contain answers to the practice activities, a list of suggested activities which should keep any LOGO student occupied for a long time, reference information for turtle commands, file commands, screen commands, editing/control characters, common error messages, arithmetic operations and Apple color codes. The reading grade level is 7. Reston Publishing Co.

Apple Mechanic* Use the keyboard to create, edit, and store hi-res characters. Includes a sixty page instruction manual. Beagle Bros. Micro Software.

Apple Menu Cookbook* Lets you develop a data storage/retrieval program for recipes that is index based and can be stored in sixty-one files. Includes conversion tables, calorie references, and an expanded appendix. Progressive Software.

Apple Mini-Assembler This is a program resident in the monitor's read only memory (ROM). It is a Machine language Assembler which uses its own very abbreviated instruction set and syntax. To use the Mini Assembler, the user requires Integer BASIC in ROM, Firmware, or in the Language Card. From Integer BASIC, the Mini-Assembler may be entered by typing CALL-151 followed by F666 G. F666 is the address where the Mini-Assembler starts. Once the user is in the Mini-Assembler the ! prompt appears. The next step in using this assembler is to set the program counter to the location where you wish the program to start. This is accomplished by typing the number of the desired location followed by a colon. For example:

```
!768:
```

Next, the mnemonic code for the first instruction should be entered. The Mini-Assembler then converts this data to hexadecimal and stores it at the location shown by the program counter. The next step is to enter a space followed by the next mnemonic instruction. The Mini-Assembler automatically places the hexadecimal equivalent of this instruction at the next available address. To exit the Mini-Assembler, enter !$FF69G. This stores the program which has been assembled in memory and returns the user to the monitor.

Apple Music* A graphics based system that plugs into your computer and home stereo system to give you an advanced synthesizer. ALF Products.

Apple Music Theory* Learn the basics of music. Equally effective with children and adults. Graphics and sound. Apple Computer, Inc.

Apple Orchard* Apple computer magazine. The *Apple Orchard* is a monthly magazine containing articles, reviews, and some tutorials on items of interest to Apple owners. Also included is information about Apple user groups and new products. Subscription rates are $24/yr or $45 for 2 years in the U.S. published by:

International Apple Core
908 George Street
Santa Clara, CA 95050

Apple Parallel Interface* APIC and APIC/G are two parallel printer interface cards. The first one offers complete graphic capabilities for the Epson printer at a low cost. The second one is a standard parallel interface card for the Apple computer. Quadram Corporation.

Apple Pascal, A Hands-On Approach* Written by Arthur Luehrmann and Herbert Peckham. This tutorial book for learning Pascal allows anyone with the Pascal diskettes (four are required for all the files) to learn to program in this language. The lessons are developed with the use of one disk drive, although two drives may be used later on. Apple Pascal requires 64K of memory so the Apple II/II+ must be equipped with a 16K RAM card (sometimes called a "language card" because it may contain the language—Integer or Applesoft—which is *not* resident in ROM). Each chapter begins with a set of goals and ends with a summary. There are problems at the end of the chapters which may be answered on the computer. McGraw-Hill Book Co.

Apple Pascal Turtlegraphics* A tutorial program that effortlessly teaches you to work with graphics before you're actually introduced to the Pascal programming language. 64K; UCSD Pascal. Edu Soft.

Apple Plot* Lets you transform measurements into specified charts and graphs. Provides an easy means of recording miles per gallon, calory intake versus calories burned, expenses compared to income, and much more! Apple Computer, Inc.

Apple Portfolio Evaluator* A maintenance program for stock portfolios that uses the Dow Jones

News/Retrieval Service to gather current prices. You may manage up to one hundred portfolios, each containing about fifty stocks. 48K; disk, printer, modem peripheral card or Apple Communications Card, and acoustic modem. Apple Computer, Inc.

Apple Post* A basic mailing list program that allows you to edit and retrieve lists of up to 500 names per disk. Apple Computer, Inc.

Apple Project Manager (APM)* A useful tool for those engaged in complicated, multi-level projects. This program utilizes a "critical path analysis" procedure aimed at handling projects made up of a number of time-related tasks. (Tasks must be sequentially ordered.) Reorganization of initial project input may be necessary in any circumstance or data changes. 48K and 80-column printer. Apple Computer, Inc.

Apple Sack 1—Business Sack* A grab bag of thirty business applications, including Schedule; Purchase; Depreciation; Interest; Cash; Mortgage; Day of Week; Future Value; Investment; and many more. Computermart.

Apple Sack 2—Home Education* A twenty-program package of educational programs including Math; Planets; Taxman; States; Metrics Quiz; Curves; Roots, and Survey. Home education programs include: Car Maintenance; Kitchen Metrics; Recipe; Mortgage; and Bartender. Computermart.

Apple Sack 5—Mail Sack* Put up to 1,000 names and addresses on each disk with this program. Sorts on one or any combination of the seven fields in each address. Disk. Computermart.

Apple Seed* A complete computer teaching course for junior and senior high levels. Includes the Show and Tell Kit with hardware samples; a copy of the book *Computer and Education* by Dr. James Poirot, which discusses various aspects of computing; *Microcomputer Systems and Apple BASIC* by Dr. Poirot, discussing microcomputers and introducing Apple BASIC; Computer Discovery, a set of demonstrations to give students some hands-on computing experience; Applesoft BASIC Tutorial, a beginning BASIC instruction set; and The Educational Software Directory, a listing of educational software. Apple Computer, Inc.

Apple Softcard III System* Expand the Apple III SOS toward dual-processor capabilities with the addition of the Softcard III system. It plugs into the peripheral card slots on the Apple III and supports the Apple 5-megabyte mass storage system, profile, and interface with both SOS and CP/M files. 128K; requires video display. Apple Computer, Inc.

Apple Speller, The* A spelling verification program compatible with most word processors. Highlights the misspelled words and makes corrections from a dictionary containing 38,000 entries. 48K. Sensible Software.

Apple Spice* A utility to make Applesoft compatible with more advanced BASICs. It adds the IF-THEN-ELSE statement and the PRINT USING function, and facilitates faster string input scanning. The package also includes a screen output module which causes word wrap-around on the right side of the screen. This module also causes characters to be erased upon backspacing. Implementation is simple. 48K. Adventure International.

Apple Tech Notes* The *Apple Tech Notes* presently include more than 700 pages of information on the hardware, software, and internal parts of the Apple, with quarterly updates available by subscription. The *Notes* cover Apple II/II+, IIe, and III computers. Your initial purchase entitles you to a binder and the current supplement. International Apple Core, Inc.

Apple Terminal-T2* Terminal T2 is an easy-to-use hardware and software system that turns your Apple II into a communication terminal. Insert the interface card into an available card slot and plug the cables into your radio. Once you enter the software from disk and enter your call sign and time, you can start receiving messages. Six stage active filter demodulators copy weak Morse code and an auto-adaptive Morse algorithm copies sloppy ones so that you can almost always be assured of excellent Morse code reception. This Apple terminal also has a built-in, multi-stage, separate and active filter RTTY and CW demodulator so that you can copy weak, noisy, or fading messages. There is a very stable built-in crystal controlled AFSK, built-in 110 or 220 volt AC power supply, built-in parallel printer-driver software, multi-level displays, and excellent documentation. Macrotronics, Inc.

Apple Tool Kit Assembler* Consists of an editor, Assembler, and Command Interpreter. A relocating loader provides for incorporation of Disk Macros and a Linking Loader. The editor is line-oriented, with a large command selection. Chained assemblies are supported by the Assembler. A HELP command displays the list of incorporated commands. Apple Computer, Inc.

Apple Trac* Keep an up-to-date accounting of your money. Data about your accounts (checking, credit cards, money market, etc.) can be inputted, and a number of different reports can be outputted to screen or printer for analysis. Nibble.

Apple World* Create, color, rotate, edit, and manipulate 3-D figures in graphic design. 48K. United Software of America.

Apple Writer II* An easy-to-use word processor offering many many of the basic functions (an improvement over the first edition). Some of the features include text editing, 80-column capabilities, automatic screen wrap-around, global search/replace of words or strings, text movement or copying within a file, scrolling, and subscript capability. One noteworthy function is the word processing language; it allows the user to write programs (within the operating files) to perform other functions using Apple Writer commands. An example would be creating sub-programs to make it easier to get into the text editing mode or call up printing commands automatically. This is the first product to offer this special language. 48K; 80-column card. Apple Computer, Inc.

Apple Writer II-IIe* By Paul Lutus. Applewriter II-IIe is one of the most popular word processors for the Apple because it is often sold as part of a package. The documentation is thorough and the program will load completely into memory (it therefore operates rather quickly). Any files constructed with AppleWriter 1.1* (an earlier version) may be updated to AppleWriter II-IIe, saving much retyping of information.

In addition to the usual ability to type, edit, and save documents (a maximum of 30,205 characters will fit into memory), it is possible to have phrases which can then be entered by just one or two key presses. You may establish a series of print format files to be used for different types of documents or tab files, and save these to disk.

Block moving is possible up to the limit of the buffer (containing 1024 characters). If you wish to move more material, you may either move it in segments, or save the entire portion to disk and then reload it at the new location. In addition, a section called word processing language. It allows you to create a file of names, addresses, or other information which may be merged into a document to create a form letter, address envelopes, etc. While there are other word processors which do various other things, AppleWriter is simple to learn and will do almost anything you'd want such a program to do. Special Delivery Software.

Apple II and Apple II+Computer Systems The Apple II and Apple II+ computers are nearly the same except for the programming language built in to the computer's read only memory (ROM). The Apple II computer uses Integer BASIC and the Apple II+ uses Applesoft (floating point) BASIC. Each of these computers provides as a standard feature one of the BASIC languages mentioned above, a built-in disassembler, a system control program in ROM, color graphics and sound capability, up to 48K of on-board RAM (Random Access Memory), slots for expanding memory via plug-in circuit boards up to 64K or higher, cassette interface, game input/output connections, ASCII typewriter keyboard, switching power supply, and eight slots for system expansion or for accessory use. The Apple II+ computer has an Auto Start feature. These computers are capable of displaying text in 24 lines of 40 characters; normal, inverse, or flashing characters; low resolution graphics displays of 40 horizontal by 40 vertical lines in color; high-resolution graphics of 280 vertical by 192 horizontal lines in color. This computer has built-in circuitry to provide only upper case display, and has only right and left arrow cursor control keys.

Apple II Business Graphics* Create graphs and charts with input numerical data. Curves are easily created for statistical predictions. Apple Computer, Inc.

Apple II DiskGuide* By Zeld Gifford. This small (5 ¼" x 5 ¼"—see why it's called a DiskGuide), 36-page book is a handy reference to the many topics concerning the Apple. Adapted from the *Apple II Users' Guide** this book presents, in condensed form, the information about BASIC commands, shape tables, ASCII character codes, PEEK and POKE locations, the monitor program, and DOS. It contains both a table of contents and an index of all commands, both BASIC and DOS. Osborne/McGraw-Hill.

Apple II Display* This is a handy board for teaching logic or troubleshooting on your Apple computer. There are sixteen address LEDs which give you the address you are looking at in binary code. There are also eight data LEDs which give you the data in that location. The board comes assembled and tested, as a bare board, or as a kit—all with documention. John Bell Engineering, Inc.

Apple II Emulation The Apple III computer can be set up to emulate an Apple II computer by inserting and booting the Emulation Diskette, supplied with the computer, in the built-in disk drive. After this diskette has been booted, the program asks the user if he wishes to configure his system prior to entering the emulation mode, or if he wishes to press RETURN and enter the mode. Configuration allows the selection of Applesoft BASIC or Integer BASIC, the indication that a serial interface card is in use, and the setting of the baud rate on the card (110 to 19200), the enabling or disabling of line feed signals to the printer, the setting of screen display line width and printer line width (40 to infinity—if infinity is selected, no line feeds are sent at the end of each line), and the enabling or disabling of printer line feed delay. Once configuration is complete or RETURN is pressed in response to the first screen displayed, the emulation program is loaded into memory. If RETURN had been pressed, the computer would be set up to run Applesoft BASIC. Integer BASIC may only be loaded via the configuration menu. In emulation mode, the Apple III computer is set to resemble an Apple II+ computer with 48K of RAM, DOS 3.3 run with Disk II controller card (the built-in drive is set to emulate a drive in slot 6). The Apple II emulation mode allows the Apple III to run most Apple II software. It will not allow the running of any software which seeks the 16K of RAM resident on the language card or a 16K RAM expansion card. It cannot handle both languages at the same time. Pascal programs which access the language card on the Apple II won't run in the emulation mode.

The emulation program occupies the memory location in the Apple III which is reserved for annunciator output to the joystick ports. This means that any Apple II programs which require this output will not run properly in the emulation mode. The joystick ports on the Apple II take the place of the game input/output connector on the Apple II. Joystick signals are treated as game paddle signals by the emulation mode.

High-resolution color graphics are not available on the Apple III, which means that programs with hi-res color run in the emulation mode are displayed in black and white on the Apple III.

An attempt to RESET during the running of a program in the emulation mode works in a different fashion on the Apple III than on the Apple II. Pressing CTRL-RESET on the Apple III causes the computer to attempt to reboot the program. This attempt is unsuccessful as the computer drops out of the emulation mode when RESET is pressed. Although the emulation mode does not give the user the full capability of running Apple II programs on the Apple III, it gives the Apple III user access to a great amount of software. Before purchasing software to run in this mode, you should test it to ensure that it will work as expected.

Apple II Senior Analyst* A modeling program for planners to analyze and review data. Also generates printer reports in English. Other built-in functions include sum, minimum, maximum, linear regression forecasting, and three kinds of depreciation. Apple Computer Inc.

Apple II User's Guide* By Lon Poole with Martin McNiff and Steven Cook. This is one of the original, and still valuable, books about the Apple II/II+. The first two chapters cover much the same material on starting up your Apple as contained in the original Apple Corp. manuals accompanying the system. However, for those who purchased a used computer, this is a valuable reference. The general information would also be applicable for the Apple IIe, but it does not address the updates and modifications for this computer. There are a number of appendices containing useful information which is found elsewhere, but not in as organized a fashion. This book, however, is still organized by large topics, not by individual words or phrases. The reading level is 7.5. Osborne/McGraw-Hill.

Apple II Utility Pack* A package of utility programs. The uses include Renumbering—Integer & Applesoft; Append—Integer & Applesoft; Line Find—Integer & Applesoft; Val() & Str$(), Screen Page Map, and Move. Disk. Southwestern Data Systems.

Apple II 6-Character Editor/Assembler* An extremely powerful Assembler and a powerful text editor. Has two-pass implementation and incorporates a text editor. Assembles code at over 3000 lines per minute. Microproducts.

Apple IIe Computer System The Apple IIe computer is the "enhanced" version of the Apple II Computer. It has Applesoft BASIC permanently in memory. It has as standard features a typewriter-style full ASCII keyboard with sixty-three keys including upper and lower case and auto-repeat, special purpose keys (up arrow, down arrow, right arrow, left arrow, tab, Open-Apple, Solid-Apple, control, SHIFT, caps lock, ESCAPE, and reset), 64K of RAM, 16K of ROM, color graphics and sound, a multi purpose video and memory expansion slot, seven slots for system expansion or accessories, switching power supply, cassette interface, D-9 style I/O connector, D-style back panel connectors, lockable case lid, and radio frequency interference shielding. The video displays normal, inverse, and flashing characters. It has 16 colors available for display on a 40 by 40 low-resolution screen and 6 colors available for display on a 280 by 192 high-resolution graphics screen. The CPU for this computer is a 6502A microprocessor with 4 registers, an 8-bit data bus, 16 bit address bus with 64K RAM memory-mapped. The system monitor provides a disassembler, automatic I/O device assignment, keyboard and screen editing, register examine and modify routines, cassette read/write routine, and hexadecimal addition/subtraction capabilities for relative branch calculations.

Apple III The Apple III provides 256K of RAM (as standard) and 4K of ROM. Apple IIIs with the old memory capacity of 128K may be upgraded. The ROM performs system diagnostics. The system has one 140K disk drive built in and can be configured for a profile megabyte hard disk drive.

The Apple III uses its own Sophisticated Operating System (SOS) to control the computer's hardware. This system updates and reads the time from a system clock. It handles interrupts and manages the system memory. The keyboard contains sixty-one keys and a separate numeric keypad. It has four directional keys for cursor control, upper and lower case, and fast repeat on all keys. Most peripherals plug into the back panel of the computer which also has four large slots to plug in connector cards for peripherals. The Apple III can display high resolution black and white video. It can also use standard color and RGB code monitors. It has a built-in speaker and an audio output jack. The computer comes with an RS-232C input/output connector on the back panel.

The system uses a 6502A microprocessor as its CPU. It is capable of emulating an Apple II or Apple II+ which allows most programs for these computers to run on the Apple III. Screen display is available in the text mode for 80 columns by 24 lines black and white, 40 columns by 24 lines black and white, or 40 columns by 24 lines color. The computer has a 280 by 192 sixteen color display, a 140 by 192 sixteen color display, and a 560 by 192 black and white display for graphics, in addition to all of the Apple II modes.

The languages used by the Apple III are Apple Business BASIC and Apple Pascal. The on-board ROMs are disabled, and the firmware card's ROMs take over, giving the user access to a second programming language (Applesoft BASIC) through the use of hardware. The user may also change to Applesoft BASIC from Integer BASIC by entering:

```
RESET
C080
RETURN
CTRL-B
RETURN
```

without turning the switch. He can shift to Integer BASIC from Applesoft BASIC by entering:

```
RESET
C081
RETURN
CTRL-B
RETURN
```

if the firmware card is installed.

Apple III Business BASIC The purchaser of the Apple III computer may purchase the Apple III Business BASIC language for use with his computer. This language is an extended version of BASIC. It contains its own file handling system. It offers a "long integer" feature which gives the user 19 digit precision with numbers. It has special formatting features for output, and allows up to sixty-four characters in variable names. Reserved words may be included in variable names as the computer using the language only recognizes reserved words when they are set off by spaces or by delimiters other than letters or numbers. The IF...THEN statement has been expanded to include the ELSE expression. This language is loaded into the computer when needed. Its prompt is the right parenthesis symbol ")." The CTRL-C key combination will interrupt a program running in this language. The reserved words in the language are:

ABS(
AND
AS
ASC(
ATN(
BUTTON(
CAT
CATALOG
CHAIN
CHR#(
CLEAR
CLOSE
CONT
CONV(
CONV$(
CONV%(
CONV&(
COS(
DATA
DEF
DEL
DELETE
DIM
DIV
ELSE
END
LOAD
LOCK
LOG(
MID$(
MOD
NEW
NEXT
NORMAL
NOT
NOTRACE
OFF
ON
OPNE
OR
OUTPUT
PDL(
PERFORM
POP
PREFIX$
PRINT
READ
RECD(
REM
RENAME
RESTORE
RESUME

EOF
ERR
ERRLIN
EXFN
EXEN%
EXP(
EXTENSION
FN
FOR
FRE
GET
GOSUB
GOTO
HEX$(
HOME
HPOS
IF
IMAGE
INPUT
INSTR(
INT(
INVERSE
INVOKE
KBD
LEFT$C
LEN(
LET
LIST
RETURN
RIGHT$(
RND(
RUN
SAVE
SCALE(
SGN(
SIN(
SPC(
SQR(
STEP
STOP
STR$(
SUB$(
SWAP
TAB(
TEN(
TEXT
THEN
TO
TRACE
TYP(
UNLOCK
USING
VAL(
VPOS
WINDOW
WRITE

Apple III COBOL* COBOL is usually associated with larger computers, but this package is one of the more powerful systems for personal computers and many minicomputers. The Apple III Sophisticated Operating System (SOS) along with a large memory and advanced I/O handling provides efficient handling of files and programs. An animator function lets the programmer look at the execution while it takes place. Apple Computer, Inc.

Apple III Information Analyst, The* An integrated system that includes Apple Business BASIC, an expanded version of BASIC that can handle advanced business and scientific programming, and VisiCalc III, to give you the power of an electronic worksheet. Generates forecasts, budgets, schedules, and mailing labels with speed and accuracy. Disk. Apple Computer, Inc.

Apple III Record Processing Services (RPS)* Data storage and retrieval are the key functions of this program. Fast file retrieval and handling, uniform performance as the file size increases, random or sequential access by key values, and record retrieval without prior sort are a few of the features available. Apple Computer, Inc.

Apple III Sophisticated Operating System (SOS)* A powerful software interface to help gain the most from the Apple III's system capabilities. It will free the programmer from system control responsibilities and is easily expandable for flexibility. Programming with the SOS will become easier through smaller program size and reduced complexity, and standarized device and file interfaces for all applications and languages. After configuration, the SOS can handle files, I/O devices, and running programs with little user involvement. It is an enhancement to the already powerful Apple III system for efficient operation and program development. Apple Computer, Inc.

Apple III Word Processor, The* This word processor features editing and writing capabilities on the Word Painter, and has Mailing List Manager for addresses and phone records. Includes a built-in clock/calendar. Apple Computer, Inc.

Apple-Aids* By Allen L. Wyatt. This set of programming utilities will allow you to do many things which you might have thought impossible. For beginning programmers, there are routines to format a blank data diskette (no DOS, so more space for data), kill DOS from already initialized diskettes to provide more storage space, an improved directory which will continue to show deleted files, and what is probably the most useful routine for beginners, UNDELETE FILES. The only drawback to this one is that you must use it before you have saved anything else to the disk.

For more advanced programmers, there are routines for listing sectors, editing the disk directly (decimal, hexadecimal, or ASCII), dumping the text screen to the printer, and creating and editing EXEC files. Howard W. Sams & Co.

Apple-Crypt* Protect your software and hardware with secret coding that only you know. The utility places encryptic coding on the data written to a disk while using a DOS 3.3 format. Computer Applications, Inc.

Applegraphics II* Pascal and FORTRAN programmers will find uses for this collection of graphics and procedures. It allows an extended use of graphic abilities. Apple Computer, Inc.

Apple-Link Apple-Link is a modem utility program which allows the user to transfer disk files from computer to computer via telephone lines. The program requires an Apple II or Apple II+ with at least 48K of RAM, one disk drive, a D.C. Hayes Micromodem II, and Applesoft either in ROM or in the Language Card. This program makes one of the units in the communication link a slave (remote) unit and the other a master unit. The remote unit does not require a copy of Apple-Link to be present in memory as the master unit controls the entire communications process. To use the program, just boot it. It searches for your modem and initializes it automatically. Once this process is complete, the program disk is removed from the boot drive and replaced with a working disk, which is set up to receive data from another terminal, or is set up with the data to be transmitted to the other terminal. The program contains an autodial routine for reaching the other terminal. It performs disk to disk transfer of data rather than cycling it through a buffer. It can operate on an automatic mode once it has been set up. A Chat mode is also supported. Computer Applications, Inc.

Applelog* Log commercial spots and daily programs. Use the billing system to keep records of expenditures and the management report for various analogies. Media Service Concepts.

Appleroots(Genealogy Software for the Apple)* Can be used for genealogy or animal breeding. There are seventeen user-definable fields, or you can default to existing field titles such as: birthplace; birth date; marriage date; and baptism date. Print functions include: individual records; index of records; four generation pedigree; records by family group; and list of children by parents. These functions can be displayed on the screen. 24K; Software House, Inc.

Applesack 6—Music & Graphics* A package of thirty programs that includes songs, hi-res pictures, lo-res pictures, 3-D, graphs, color generators, figures, and art. Computermart.

Applescope* Create a digital storage oscilloscope with this package. A digital control board and two high-speed A/D converters are put together to take advantage of the high-resolultion graphics capabilities of the Apple computer. This system offers a 1024-byte buffer memory, pretrigger viewing of up to 1020 samples, programmable scale select, single or dual channel trace, and continuous and single sweep modes. R C Electronics Inc.

Applesoft BASIC Applesoft BASIC is an extended BASIC programming language which is resident in the Apple II+ and Apple IIe computers' ROM. The language was developed by MicroSoft to enable the user to communicate data and program instructions to the computer. Applesoft BASIC is also called "Floating Point" BASIC because it can handle decimal points in its calculations. It provides up to 9 digits in numeric displays before resorting to exponential notation. It can access the Apple's high-resolution graphics display screens. It makes use of user-programmable error messages to assist in debugging programs. This language provides a large number of built in mathematical, transcendental, and trigonometric functions to provide the user with the ability to perform complicated scientific or financial calculations. It is also capable of handling multi-dimensional alpha or numeric data arrays with up to 88 dimensions. The following commands are available in Applesoft BASIC:

ABS
ASC
ATN
CALL
CHR$
CLEAR
COLOR=
CONT
COS
CTRL-C
CTRL-X
DATA
DEF FN
DEL
DIM AGE
DRAW
END
esc A
esc B
esc C
esc D
EXP
FLASH
FOR...NEXT
FRE
GET ANS$
GOSUB
GOTO GR
HCOLOR=
HGR
HGR2
HIMEN
HLIN
HOME
HPLOT
HTAB
IF...THEN
INPUT
INT (number)
INVERSE
IN#
LEFT$
LEN
MID$
NEW
NEXT
NORMAL
NOTRACE
ON...GOSUB
ON...GOTO
ONERR GOTO
PDL
PEEK
PLOT
POKE
POP
POS
PRINT
PR#
READ
RECALL
REM
RESTORE
RESUME
RETURN
RIGHT$
RND
ROT
RUN
SAVE
SCALE=
SCRN
SGN (number)
SHLOAD
SIN
SPC
SPEED=
SQR
STOP
STORE
STR$
TAB
TAN
TEXT
TRACE
USR

LET
LIST
LOAD
LOG
LOMEN
VAL
VLIN
VTAB
WAIT
XDRAW

Each of these commands are explained in detail in this book. See also Programming, Programming Languages, and entries for each of the commands listed above.

Applesoft BASIC* A starter tutorial for the beginning user or someone wanting to review BASIC. The course introduces computers and data processing, and then teaches a BASIC subset, including loops, variables, subroutines, and arrays. Disk. Little Genius Ltd.

Applesoft Compiler* This compiler converts programs written in Applesoft BASIC to Machine language programs which run three to more than twelve times faster than the program written in Applesoft. The Hayden Applesoft Compiler allows the user to debug programs written in Applesoft. It has a number of routines which set up vectors for looking up data contained multidimensional arrays. This procedure accelerates the use of arrays by programs. The compiler is transparent to the user and requires at least 48K of RAM and one disk drive to operate. Applesoft must be present in RAM (or must have been loaded into a RAM expansion card) prior to using this program. Hayden Software.

Applesoft Editrom* A utility for easier editing during program development. It will find any string of characters, constants, or variables and tell you where they are defined and found in the program. Prevent program interruption when you need to know about or change, field names. Soft Control Systems.

Applesoft Linefinder* For locating program lines in memory in order to repair programs, improve program efficiency, etc. Also produces information on program start/end, HIMEM, free-space, variables, strings, and arrays. Nibble.

Applesoft Plus Structured BASIC (APLUS)* A Machine language utility that adds structured programming commands to Applesoft BASIC: WHEN ...ELSE...FIN, UNTIL, WHILE, UNLESS, SELECT, CASE, and multi-line IF..FIN is supported. Named subroutines can be used. &LISTed programs are indented for clarification. &CONVERT command replaces structured commands with GOTOs and GOSUBs to create a standard program as output. Sensible Software.

Applesoft Programmer* Professionally format your screen input and output. Your specifications effect such things as: flashing cursor, number of input characters, numeric accuracy, default values for string or numeric variables, comma insertion in numbers, right-justification column, etc. Single key commands can be used in your programs. Applesoft Programmer is a valuable tool for developing your programs for the commercial market. Johnny Appleseed Software and Company.

Applesoft Special Features* A set of training materials for an Applesoft BASIC course. Topics include graphics, sound, binary files, and more. The included disk has demonstration programs for all covered subjects. The manual includes teachers notes, lesson outlines, and program listings for the sample programs on disk. 32K; disk. Minnesota Educational Computing Consortium.

Applesoft II Firmware Card* A plug-in board which converts the Apple II computer with Integer BASIC in Read-Only Memory to a computer with Applesoft BASIC (floating-point) programming capability through the use of hardware. This board or card may be plugged into any of the Apple Computer's expansion slots. See Apple Firmware Card*.

Applesoft II Utility I* Provides the following features: automatic line renumbering; EXEC file creation for subroutine files; and automatic program running. Cassette or disk. Powersoft, Inc.

Applespice* Make Applesoft BASIC programming easier and faster. Expansion of some BASIC commands (Print Using, If-Then-Else, Line Input) and other features help you concentrate on the logic of the program and not the time-consuming set-up proceedures. 48K; 3.2 or Muffin to 3.3 DOS. Adventure International.

Appletext—An Apple II Disassembler* A two-pass system that is compatible with the Microproducts Co-Resident Assembler. The first pass creates label statements for external references. The second pass translates Machine language to text statements. Text files from Machine Code may be created for either selected routines or entire programs. Cassette or disk. Microproducts. See Microproducts MDS.

Applethrottle* Use this board and your game paddles to control the speed of your computer. You can put the computer into slow, fast, or normal modes. This can be very useful when using the LIST, TRACE, or RUN statements. West Side Electronics.

Apple-Time Clock/Calendar Board* This board will fit inside your Apple computer and provide you with the following features: twelve or twenty-four hour display, month-day-year display, crystal-controlled time base, and four interrupts. Compu-Time.

Applewriter Graphics* Gives you hard copy results of the character sets available with DOS Tool Kit. Features menus and options for printing and a selection of print "fonts". Requires 3.3 DOS Tool Kit. Computer Stations, Inc..

Appli-Card* Run CP/M-80 with this single card which includes a Z-80 processor, 64K memory (63K available to the user), 2K PROM, parallel port, and more. You can run your 6502 processor simultaneously with the Z-80 processor: the Z-80 runs the CP/M software and the 6502 becomes the processor for input and output—making all operations very fast. Lifeboat Associates.

Application Text Editor* Operates in both upper and lower case. A versatile editor with a complete selection of the necessary editing functions. Computer Components, Inc.

Applications Software A software package is a group of computer programs, possibly including data files and documentation, that perform a function or group of related functions on the computer. These are called applications software when they aid the user in specific practical tasks. Examples would be a word processing package, an accounting package, etc. Systems software packages, on the other hand, facilitate the use of the machinery; these include disk operating systems, or program development packages.

Appointment Calendar, The* A package suited for any type of professional office where clients schedule appointments. A number of file types can be incorporated to follow up client visits, payments, messages, etc. A full range of formats to make custom designing available. Charles Mann & Associates.

Appointments* A versatile scheduler for an office that handles appointments. Full editing capabilities for descriptions of clients, their appointments and history of past visits. Daily, weekly, or monthly scheduling can be set up and printed. Andent.

APR Loan Analysis* A program to calculate actual annual percentage rates of loans, for use by brokers, investors, and others who need this information at their fingertips. You can compare loans on the basis of interest rate, fees, and time period, evaluate specific loans, or vary options to create optimal alternatives. Cassette or disk. Realty Software.

APR Loan Analysis* Provides the ability to evaluate and compare loans based on time period, indicated interest rate, and loan fees (points). Prepared for those investors, loan brokers, and others interested in the actual percentage rate (APR). Realty Software.

Arbitration Management of various claims of competing systems or processes for a limited resource. Bus arbitration allocates a system bus among the sub-system components, i.e., the CPU, memory, disk controller, and other external devices.

Arccosecant Function This trigonometric functions, is not built into Applesoft BASIC or Integer BASIC function on the Apple II, Apple II+, or Apple IIe Computers. In trigonometry, the arccosecant is the inverse cosecant of an angle. In Applesoft BASIC it can be derived with the following expression:

```
ARCCSC (x) = ATN (1/SQR(x*x-1))
    + (SGN(x)-1)* 1.5708
```

The derivation uses the built in Arctangent Function explained below. See Trigonometic Functions.

Arccosine Function This trigonometric function, like the Arccosecant Function, is not built-in to Applesoft BASIC or Integer BASIC. In trigonometry, the arccosine is the inverse cosine of the angle. In Applesoft BASIC it can be derived by using the following expression:

```
ARCCOS (x) = -ATN (x/SQR(-x*x+1)+ 1.5108
```

This derivation also uses the built-in Arctangent tion described below. See Trigonometric Function.

Arccotangent Function This trigonometric function, like the Arccosecant and the Arccosine Functions, is not built in to Applesoft BASIC or Integer BASIC. In trigonometry, the arccotangent is the inverse cotangent of an angle. In Applesoft BASIC it can be derived by using the following expression:

```
ARCCOT (x) = -ATN(x) + 1.5708
```

This derivation also uses the built-in Arctangent Function described below.

Architecture The special selection, design, and inter-connection of the principal components of a system. In a microprocessing unit this could be the number and function of registers, the instruction addressing modes, and the bus structure and timing. The manner in which the various major components of a microcomputer system are selected, employed, and interconnected reflect the architecture of the system. The Apple II Computer is a single board microcomputer which relies on a 6502 microprocessor chip to process data. This chip is an 8-bit microprocessor capable of directly addressing 64K bytes of memory. It can therefore output a 16-bit address. The Apple II uses three primary buses to communicate with memory and peripherals. These buses are the address bus (16 bits), the data bus (8 bits), and the control bus. A number of clock (timing signal) lines and control lines emanate from the microprocessor chip. The Apple II Computer has up to 48K of internal random access memory (RAM-volatile) and up to 12K of read-only memory (ROM-permanent). This computer can communicate with four onboard input/output (I/O) circuits. These are the speaker, game port, cassette port, and keyboard. It can also communicate with up to eight external devices via I/O circuits connecting the microprocessor with eight 50 pin slots at the rear of the computer's motherboard. Additional hardware and circuitry is built into the Apple II Computer to generate video signals, map their location in memory, and synchronize with monitor scan. Power is provided to the computer's circuits from a switching power supply which supplies +5V, +12V, -5V, and -12V to the circuits as required. Part of the RAM of the computer is dedicated solely to addressing the video screen. This information describes in general terms the architecture of the Apple II Computer for information on other models, see the sections on the Apple II+, Apple IIe, and Apple III Computers.

Arcsecant Function This trigonometric function is not a built-in Applesoft BASIC or Integer BASIC function on the Apple II, Apple II+, or Apple IIe Computer. In trigonometry, the Arcsecant is the inverse of the secant of an angle. It can be derived in Applesoft BASIC by using:

ARCSEC (x) = ATN (SQR(x*x-1))+(SGN(x)-1) *1.5708.

Arcsine Function This trigonometric function is a derived function similar to the Arccosine Function. To derive this function in Applesoft BASIC, use:

ARCSIN (x) = ATN (x/SQR(-x*x+1))

where ATN is the built-in Arctangent Function in Applesoft BASIC.

Arctangent BASIC. See ATN(x).

Arctangent Function This built-in Applesoft Function (ATN) returns the arctangent of the argument in radians. For example, if you enter:

PRINT ATN (25)

the system returns radians.

Area Under a Curve* Color and hi-res graphics enhance the demonstration of the method of lower sum, upper sum, and Riemann sum approximations for the area under a curve. Great for a beginning calculus class. 32K; disk. Math Software.

Argument An argument is a number or an arithmetic expression which is used by a function to supply an answer. In examples of functions, arguments are inserted in parentheses. In the statement PRINT (x+1), "x+1" is the argument. In the statement PRINT ABS (-3.232), "-3.232" is the argument. See Functions.

Aristotle's Apple* A generalized tutorial program to assist learning in any subject at any level. This highly flexible teaching aid helps with instruction and then can be used for testing and evaluation. It was designed by a Computer Aided Instruction specialist, is very user friendly, and can be used in almost any learning environment, from home study to professional training. 48K; Applesoft; disk. Stoneware Microcomputer Products.

Arith-Magic* Consists of three games for children in second through ninth grades. The functions learned range between numeric difference and square roots. 32K or 48K. Quality Educational Designs.

Arithmetic Expression A programming instruction requiring the performance of a mathematical operation.

Arithmetic Logic Operator See Alop. The logical operator which makes a conditional operation work. In Applesoft BASIC the logical operators are:

=>
AND
OR
>
<=
<>
<
⩽
=<
⩾
>

Arithmetic Logic Unit ALU. The element in the central processor which performs basic data manipulations such as add, subtract, complement, negate, rotate, AND, and OR.

Arithmetic of Functions* An eight menu selection for each function, then, four choices for the operation provide two hundred and fifty-six choices. This program graphs the function f, the function g, and then the function [h = function (f) operation function (g)]. User supplied functions are also handled. 32K. Math Software.

Arithmetic Operator See AOP. In Applesoft BASIC and Integer BASIC the arithmetic operators are +(plus), -(minus), /(divided by), *(times), and — (raised to the power of).

Arithmetic Racing* Provides young students with plenty of practice in mathematical skills. Ten questions about the same arithmetic function must be answered in a given amount of time. 32K. Math Software.

Arithmetic Statement An instruction specifying an arithmetic operation.

Arithmetic Variable See AVAR. The variable elements of arithmetic and algebraic expressions. In Applesoft BASIC, simple variables occupy seven bytes of memory. Two bytes are dedicated to the variable name, and five bytes to the real (floating-point) or integer value. In arrays, real variables occupy five bytes and integer variables occupy two bytes.

Arnold* Teaches tone recognition and melodic memory skills with five levels of skill that will please both untrained and experienced musical ears. This program asks you to recall and enter tones of a melody using solfeggio syllables or scale degree numbers. Ninety-five graded melodies serve as the patterns. 48K; Micro Music, Inc.

ARQ Automatic ReQuest for repeat. In telecommunications, a device capable of determining whether it has correctly received information transmitted from another source. It may automatically request a repeat transmission if the first attempt was unsuccessful.

Arrays BASIC. See DIM and OPTION BASE.

Arrays Arrays are logical ways of presenting a large number or collection of related variables. They must be given a generic name, called the array name, and a position number within the array called the index. Integer BASIC allows the use of integers and strings in arrays. Applesoft BASIC allows strings (letters), real variables, or integer variables in its arrays. In its most simple terms, an array is a tabular representation of data (integer, real number, or string). It can have a single dimension (one line) or two dimensions (columns and rows). Through the use of the array name, which is any legal variable name in Integer BASIC or Applesoft BASIC, and by dimensioning the array (assigning the number of elements in the array and reserving memory space), and through indexing (indicating the position in the array) the element you wish to use, you can limit the number of variables used in a formula or expression by collecting the related variables and placing them into a table form. The following program illustrates the use of arrays:

```
10 REMARRAYS AND OPERATIONS WITH ARRAYS
15 REMDIMENSION ARRAY FOR 5 NUMBERS
20 DIM N(5)
27 PRINT “ENTER 5 NUMBERS WHEN INSTRUCTED TO DO”
28 PRINT “SO. THE PROGRAM WILL PLACE THEM IN AN”
29 PRINT “ARRAY AND MANIPULATE THEM AS SHOWN.”
30 PRINT : PRINT : PRINT
32 FOR M = 1 TO 5
35 PRINT “INPUT NUMBER “;M;”=”;
40 INPUT N(M)
45 NEXT M
50 PRINT : PRINT
55 PRINT “TO USE THE NUMBERS YOU PROVIDED:::”
57 PRINT : PRINT
60 PRINT “S”; TAB(5);“N(S)”; TAB(12); “N(S)*2”; TAB(24);“N(S)+12”
65 FOR S = 1 TO 5
70 PRINT S; TAB(7);N(S); TAB(13);N(S) * 2; TAB(26);N(S) + 12
75 NEXT S: PRINT
80 END
```

In Applesoft BASIC, an array may have a maximum of 88 dimensions. If one element of an array is used before the array is dimensioned, Applesoft BASIC assigns a default value of 10 for each dimension in that element's subscript. Array elements are set to 0 when the RUN or CLEAR commands are executed.

Array operations and input are always begun by using a DIM statement which reserves memory space for the array. This statement would look like DIM N(5) where N is the variable and (5) is the subscript. See DIM.

Arrow Keys Arrow keys are used to position the cursor and to add characters to memory or to erase them from memory. The Apple II and Apple II+ computers have only a right arrow key and a left arrow key on the keyboard. To move the cursor around the screen for editing purposes, four other keys are used in conjunction with the ESC (ESCape) Key. To move the cursor to the right, use ESC-A (press the escape key and the “A” key at the same time. The ESC-B key moves the cursor to the left, the ESC-C moves the cursor down. The ESC-D moves the cursor up. Once the cursor is positioned to the left of the data to be read into memory, the right arrow key may be used to read this data in.

Once the cursor is placed immediately to the left of any data to be erased, the left arrow key can be used to erase data. Since the Apple II and Apple II+ computers do not have repeating features for individual keys, the "Repeat" key must be used along with the arrow keys or the escape key combinations explained above to obtain continuous movement of the cursor in any direction. When the ESC-A, ESC-B, ESC-C and ESC-D combinations are used, ESC must be pressed before each move. The repeat key works only with ESC-I, ESC-J, ESC-K, and ESC-M. Another escape key combination for cursor control which is much easier to use than the A, B, C, D combination described above is the ESC-I, -J, -K, -M combination which works as follows:

ESC-I moves the cursor up. ESC-J moves the cursor left. ESC-K moves the cursor right. ESC-M moves the cursor down. It should be noted that the movement of the cursor on the screen with the ESC key combinations at no time erases or deletes text from the computer's memory. The arrow keys are used to add or delete text. The Apple IIe and Apple III computers have four directional arrows for cursor movement. The Escape key combinations should be used with these computers for editing in the same manner as these keys are used on the Apple II and Apple II+ Computers.

Artist, The* A graphics and animation program that can assist the user in the development of software. Includes many programming routines for developing shape tables, customizing fonts, and text additions. Sierra On-Line Systems.

Artist Designer* Create almost any geometric shape imaginable in five colors. Features a detailed menu, submenus, and twenty-five designs which may be modified. 48K; disk. Apple Computer, Inc.

AS EXTENSION In Apple III Business BASIC, this instruction is used in file handling from within programs. It is used with the OPEN # command to instruct the computer to make a sequential access to one file after another during output to screen or printer. This access is made in such a fashion that output is continuous but data within the files accessed is left intact.

AS INPUT This command is used within programs in Apple III Business BASIC in conjunction with the OPEN # command. When this command is used, it ensures that the file to which it refers is treated as a read-only file. The syntax of this instruction is:

```
OPEN # 3 AS INPUT, Address.
```

AS OUTPUT This command is similar to the AS INPUT command in Apple III Business BASIC. It instructs the computer to treat the referenced file as a write-only file. A file set up in this fashion cannot be read.

ASC In Applesoft BASIC and in Integer BASIC, the ASC function returns the ASCII numeric value of the character used in the argument portion of the expression. For example, PRINT ASC("B") produces the numeric value for the letter B, which is the decimal 66. If the value displayed is greater than 128, the user must subtract 128 from this value to find the proper standard ASCII value.

ASC BASIC Function in CP/M. ASC returns the ASCII code for the first character of the string x$. The format is:

```
<variable> = ASC(<x$ >)
```

<x$ > may be any string expression. For example:

```
10 x$ = "SAMPLE"
20 PRINT ASC(x$ )
RUN
```

In this example, the ASCII code for "S" is 83. "S" is the first character of the string "SAMPLE". If x$ is null, the error message "Illegal function call" is returned. For a listing of the ASCII codes see ASCII Character Codes.

ASCII American Standard Code for Information Interchange. This standard code assigns specific values between 0 and 127 to each of the 128 numbers, letters, special characters and control characters used by the Apple II and Apple II+.

ASCII If you want to save a BASIC program in CP/M in ASCII format, which allows you to MERGE two programs together, put ,A after the close quote of the program name thus:

```
SAVE "SAMPLE",A
```

See MERGE.

Instructions for SAVEing a program named "SAMPLE" are as follows:

On diskette (the default drive) enter:

```
SAVE "SAMPLE"
```

On diskette (drive B) enter:

```
SAVE "B:SAMPLE"
```

On cassette, first rewind the cassette, press PLAY and RECORD together, then enter:

```
SAVE "CAS1:SAMPLE"
```

To SAVE the program as a protected file in encoded binary form use ,P instead of ,A. Then it can not be listed, saved, edited (or unprotected). While a clever programmer can get around this, it will at least prevent a quick and casual, or accidental, modification to your program.

The SAVE instruction does not alter your program in memory. It is important to be aware that if you write a BASIC program, it will be lost (erased) unless you SAVE it before you turn off the Apple go to DOS (SYSTEM Command) or use the NEW command. See also BASIC Editing.

To run the program at a later time, use the LOAD command to copy it from the diskette (cassette) you saved it on, back into the Apple's memory. See LOAD.

ASCII Character Codes The Apple II and Apple II+ computers each have a fifty-two character keyboard similar to that of a typewriter. Each key on the keyboard provides the computer with an ASCII code when the key is pressed. In the Apple II and Apple II+ this ASCII code is upper case only. The Apple IIe and Apple III computers produce both upper case and lower case ASCII codes. The ASCII decimal equivalents to the Apple II and Apple II+ keyboard are presented below:

Apple II and Apple II+ keyboard keys and their ASCII Decimal Equivalent Codes follow:

KEY	ALONE	CTRL	SHIFT	BOTH
SPACE	32	N/A	N/A	N/A
0	48	N/A	N/A	N/A
1!	49	N/A	33	N/A
2″	50	N/A	34	N/A
3#	51	N/A	35	N/A
4$	52	N/A	36	N/A
5%	53	N/A	37	N/A
6&	54	N/A	38	N/A
7′	55	N/A	39	N/A
8(	56	N/A	40	N/A
9)	57	N/A	41	N/A
:*	58	N/A	42	N/A
;+	59	N/A	43	N/A
,<	44	N/A	60	N/A
-=	45	N/A	61	N/A
.>	46	N/A	62	N/A
/?	47	N/A	63	N/A
A	65	1	N/A	N/A
B	66	2	N/A	N/A
C	67	3	N/A	N/A
D	68	4	N/A	N/A
E	69	5	N/A	N/A
F	70	6	N/A	N/A
RETURN		N/A	N/A	N/A
G	71	7	N/A	N/A
H	72	8	N/A	N/A
I	73	9	N/A	N/A
J	74	10	N/A	N/A
K	75	11	N/A	N/A
L	76	12	N/A	N/A
M	77	13	93	29
N—	78	14	94	30
O	79	15	N/A	N/A
P@	80	16	64	N/A
Q	81	17	N/A	N/A
R	82	18	N/A	N/A
S	83	19	N/A	N/A
T	84	20	N/A	N/A
U	85	21	N/A	N/A
V	86	22	N/A	N/A
W	87	23	N/A	N/A
X	88	24	N/A	N/A
Y	89	25	N/A	N/A
Z	90	26	N/A	N/A
→	21	N/A	N/A	N/A
←	8	N/A	N/A	N/A
ESC	27			

ASCII Character Codes—Apple IIe The Apple IIe keyboard produces an ASCII code each time a key is pressed. The table below lists the ASCII decimal code for each key on the Apple IIe keyboard.

KEY	ALONE	CTRL	SHIFT
SPACE	32	N/A	N/A
0)	48	N/A	41
1 !	49	N/A	33
2 @	50	N/A	34
3 #	51	N/A	35
4 $	52	N/A	36
5 %	53	N/A	37
6 —	54	N/A	94
7 &	55	N/A	38
8 *	56	N/A	42
9 (	57	N/A	40
-	45	N/A	95
= +	61	N/A	43
DEL	127	N/A	N/A
[+	91	N/A	123
] †	93	N/A	125
|M	124	N/A	92
: ;	58	N/A	59
“ ‘	34	N/A	39
, <	44	N/A	60
	46	N/A	62
/ ?	47	N/A	63
A	97	1	65
B	98	2	66
C	99	3	67
D	100	4	68
E	101	5	69
F	102	6	70

KEY	ALONE	CTRL	SHIFT
RETURN	N/A	N/A	N/A
G	103	7	71
H	104	8	72
I	105	9	73
J	106	10	74
K	107	11	75
L	108	12	76
M	109	13	77
N	110	14	78
O	111	15	79
P	112	16	80
Q	113	17	81
R	114	18	82
S	115	19	83
T	116	20	84
U	117	21	85
V	118	22	86
W	119	23	87
X	120	24	88
Y	121	25	89
Z	122	26	90
→	21	N/A	N/A
]LF	8	N/A	N/A
↑	11	N/A	N/A
↓	10	N/A	N/A
TAB	9	N/A	N/A
ESC	27	N/A	N/A

ASCII Character Codes—Apple III The ASCII character codes for the characters on the Apple III keyboard are set up as follows in decimal notation:

KEY	ALONE	CTRL	SHIFT
SPACE	32	N/A	N/A
0)	48	N/A	41
1 !	49	N/A	33
2 @	50	N/A	64
3 #	51	N/A	35
4 $	52	N/A	36
5 %	53	N/A	37
6 —	54	N/A	94
7 &	55	N/A	38
8 *	56	N/A	42
9 (	57	N/A	40
-	45	N/A	95
= +	61	N/A	43
M|	92	N/A	124
] †	93	N/A	125
[+	91	N/A	123
. >	46	N/A	62
, <	44	N/A	60
/ ?	45	N/A	61
A	97	1	65
B	98	2	66
C	99	3	67
D	100	4	68
E	101	5	69
F	102	6	70
RETURN	N/A	N/A	
G	103	7	71
H	104	8	72
I	105	9	73
J	106	10	74
K	107	11	75
L	108	12	76
M	109	13	77
N	110	14	78
O	111	15	79
P	112	16	80
Q	113	17	81
R	114	18	82
S	115	19	83
T	116	20	84
U	117	21	85
V	118	22	86
W	119	23	87
X	120	24	88
Y	121	25	89
Z	122	26	90
’	96	N/A	N/A
→	21	N/A	N/A
]LF	8	N/A	N/A
ESCAPE	27	N/A	N/A

ASCII Code to Characters BASIC. See CHR$(n).

ASCII Codes for Characters BASIC. See ASC (x$).

ASCII Control Characters Printer with BASIC. See Type Formats—Printer.

ASCII Express II* ASCII Express II is a terminal communications program which operates on an Apple II or Apple II+ computer equipped with a D.C. Hayes Micromodem IIe*, and the Apple Communications Card* or its equivalent. This program also requires a minimum of 48K memory, DOS 3.3, and either Applesoft in ROM or in expanded memory. It also requires the use of an 80-column video expansion card. Upper/lower case adapters can be used, and are recommended by the manufacturer of the program.

This program can be used to initiate, manage, and terminate telecommunications processes with other computers via telephone lines or with a direct link up via RS-232 interface cards installed in both computers. The program contains a complete text editor for creating, editing, and storing files for use by the communications program. This editor can also be used to edit any files which may have been received by the communications program. The program includes a versatile communications package which includes auto dialing from a file of up to 18 telephone numbers; the ability to create and use Macro command structures; and the ability to configure for a variety of system installations of communications cards, printers, disk drives, and other peripherals. It also can be configured for a variety of communications protocols employed by the system in communication with the user's system. The Macro feature can be used to set up complex log on and log off sequences as a single keystroke. This feature saves time and prevents the user from going through tedious, complicated log on procedures time after time.

The configuration routine included in this program allows the user to set up full-or half-duplex communications modes; to enable or disable carrier detect procedures; recognize hardware supported upper/lower case display installations; select baud rates of 110 or 300; recognize a single character screen clear command; select alternate modem slots; select alternate printer slots; select alternate parity options; turn printer line feed on or off; turn printer form feed on or off; employ printer initialization strings if required; and to adjust scrolling speed on the video display screen. The program allows the user's computer to be set up as a master or slave device in the communications process. It can be configured to send data a line at a time or a character at a time.

The Main Command Menu allows the user's system the options of answering an incoming call and receiving files from another system, accessing a submenu, dialing another system, ending the program, displaying free space on the storage disk, getting a file from disk, accessing Macro files, accessing number files for auto dialing, output the program buffer to the printer, saving the buffer contents to disk, receiving a file from another system, sending a file to another system, viewing buffer contents, and exiting the main program to the line editor. The Sub Command Menu allows the user to alter baud rate; enter terminal mode; clear buffer contents or append data to the current contents of the buffer; end the program; hang up the phone; access the Main Command Menu; turn the printer on; save a file to disk; or employ a video and data capture routine which records control characters and escape codes rather than ignoring them. The Macro Command Menu allows the Macro buffer to be cleared, gets Macro files from disk, accesses the Main Command Menu, accesses the Numbers file, saves Macros to disk, and allows the current Macro file to be viewed and edited. ASCII EXPRESS II is intended to provide the user with the means of communicating with other systems via telephone lines or directly in conjunction with DOS 3.3. It provides the user with a variety of editing, file manipulation, printing, and communications features. It is a good program, within the limitations described above, for the novice user and experienced user of the Apple II and Apple II+ computer. Southwestern Data Systems.

ASCII Express "The Professional"* A utility that will support printer interfaces, modems, and 80-column printer boards. Includes a text editor, and can be used as a word processor. A complete communication software package that has less than user-friendly documentation. 48K; disk, a micro-modem or communication card and acoustic coupler. Southwestern Data Systems.

ASCII Keyboard Generally this keyboard includes three cases for each alpha character: upper case, lower case, and control. This keyboard provides keys for the set of ASCII characters.

ASL The Assembly language mnemonic for shift the contents of memory or the accumulator left one bit.

ASM In CP/M the command ASM executes the Assembler which resides in the ASM.COM program. This program, when run, translates Assembly language source files into Machine language files (assembles the files). To use this command, type in ASM file name, which causes the system to look for a file written in ASCII text, and usually designated as *filename*. ASM in the directory. The user could also type in ASM-filename.shp where "s" is the drive designator transferred, "h" is the instruction to find the hexadecimal file, and "p" is the drive designator (A, B, etc.) of the disk drive to which the file is being transferred or the terminal on which this file will be displayed. The first format creates the hex file on the same disk drive where it resides in source form. The second format transfers the newly created hex file to a second disk drive or to a terminal display where it resides in source form.

Example 1

```
A> ASM BOOT
```

This assembles the file BOOT.ASM on drive A.

Example 2

```
A> ASM BOOT.ABZ
```

This assembes the file BOOT.ASM in drive A and places the new file on drive B without creating a .PRN file on drive B.

Example 3

```
A> ASM BOOT.ABP
```

Creates A .PRN file on drive B.

ASM/65 Editor Assembler* A powerful, two-pass Assembler. Co-resident with the Assembler is the PIE Text Editor. Some of the features of this system are: decimal, hexadecimal, octal, and binary constants; ASCII literal constants; one to six character symbols; high-and low-byte selection operators; source statements of the form, (label) (opcode) (operand) (comment); fifty-six valid addressing modes; equate directive; and much more. Disk. Optimized Systems Software.

Aspectarian The angular relationships between planets. First, an astrology chart is calculated; second, it is put into horoscope form; and third, the aspects are listed.

ASR Automatic Send Receive. A terminal having not only a keyboard and printer, but also an automatic reading and recording device, such as a cassette tape unit or a paper tape reader and punch.

Assembler A program which converts, into binary object code, the mnemonic form of the computer's language for execution. It acts as a compiler for Assembly language programs.

Assembler Synonym for Assembly. See Assembly for a description of this programming language.

Assembler Teacher* A program to teach you Assembler. This package contains a reference manual, a 6502 Assembler manual, and the "teacher." You'll be taken step-by-step through the computer's memory and see it operate in slow motion. The package is written by a Ph.D. in computer science who teaches Assembler. DOS 3.3 required. Computer Works, Inc.

Assembly Language Assembly language is a language which is very closely related to Machine language. The primary difference between the two languages is that Assembly language utilizes *mnemonic* abbreviations and *symbols* to instruct the 6502 microprocessor to take some action. To enter the Mini Assembler from Applesoft BASIC or Integer BASIC, enter CALL-2458. This causes the speaker to Beep and A! prompt to appear on the screen. If you type LDA#$12 the value 12 will be loaded directly to the accumulator. To get back to BASIC enter $ CTRL-B if Applesoft BASIC is resident in ROM on your computer. If you are using Disk-Based Applesoft BASIC, enter $30G. To get to the Mini Assembler from the monitor, enter *F666G. To get back to the monitor from the Mini Assembler, enter $FF68G. Usually an Assembler program is longer and more difficult to understand (and to code) than a BASIC program to perform the same process. Originally only assemblers were available for writing programs. The tedious and time-consuming nature of Assembler programming led to the invention of "high level" languages, such as BASIC, FORTRAN, COBOL, and Pascal. These languages greatly abbreviate the description of the work to be done by the computer. A complex translation process is required to turn the high-level program into a Machine language program that the Z-80 can use. This translation process is time consuming and usually results in a Machine language program that runs many times slower than a corresponding program written in Assembler.

The compiled program is also usually many times larger than a corresponding program written in Assembler because higher level languages simplify the programmer's job by using very general program procedures which can handle all possible circumstances in which the statements might be used. Since, for a particular program, only a small fraction of this generalized code is needed, much of the code produced by the compiler is superfluous. The information required to specify whether or not it is needed is exactly what was left out in simplifying the higher level language.

Interpreted languages (such as BASIC) have an additional performance disadvantage. They do the translation of higher level source code into executable Machine Code every time the program is executed, rather than only once.

Assembly language programs can run much faster, use less memory, and access more special machine level languages. Assembler is popular with software houses for writing programs that must run very fast (action games or programs to run fast devices such as disk drives, etc.). But, because Assembler is harder to code, fewer individual users write programs in Assembler. Those who do ordinarily write only selected time-critical or highly specialized routines. More commonly, a program written largely in, for example, BASIC, may use a short section of code written in Assembler to do one particular time-critical or memory size critical task. The Assembler code will be called as a subroutine by the BASIC program.

Assembly Language (Assembler) In CP/M a facility similar to that described above for the 6502 microprocessor is available for assembling Machine language programs with mnemonics and symbols for the Z-80 microprocessor, which takes over operation of the Apple II, Apple II+ or Apple IIe Computers equipped with CP/M or Z-80 card.

Assembly Language Development System* An Assembler/editor/formatter which includes a cursor-based editor, disk-based macros, and local and global labels. Hayden Book Company.

Assertion The placement of a logical operator in a conditional statement. In the statement "IF A=0 THEN GOTO 125," "A=0" is the assertion. The IF statement is true or false depending on whether the assertion is true or false.

Asset Manager* Calculate depreciation and credits for tax investments for valuable possessions. Information will then be readily available on the books when it comes time for taxes. Disk. Monument Computer Service.

Asset Record Program* Maintains records on the values of your small business capital stock and investments. This system will keep track of investment tax credits and straight-line depreciation values, and has sorting capabilities for audit purposes. It parallels many manual systems, to allow for a smooth changeover to automated procedures. 16K. Charles Mann and Associates.

Asset-Manager* For balance sheets and establishing asset values for amortization and tax schedules. Micro Lab.

Assignment Giving a variable a value. In BASIC, a simple assignment would be:

```
LET X=5
```

This assigns the value 5 to the variable X.

Assignment Set* The companion program to Course Outline containing programming problems and review questions. Program assignments are divided into an eleven week course. 32K; DOS 3.2.1 or 3.3. Indian Head Software.

Assignment Statement An assignment statement is a statement within a program which specifies a value for a variable. Examples of assignment statements are:

```
Example 1:10 A=12
Example 2:10 LET A=12
```

The command "LET" is optional in Applesoft BASIC and in Integer BASIC.

Assistant Principal* Prepares all schedules, class assignments, teacher assignments, report cards, and attendance reports for the school administration. Student data may be added, deleted, and edited. Disk. Monument Computer Service.

ASSM/TED 1.0* A 6502 Macro Assembler and text editor. The Assembler generates object code directly to disk, memory, and/or tape; allows internal and external label specification and generates relocatable object code; provides some macro capability. The editor is a very powerful line-oriented editor: auto line numbering, renumbering, line copy, line search, line moves, and global change. Disk. Eastern House Software.

Association for Computing Machinery The major international society for computer technology is the ACM. Through its numerous publication and special interest groups, ACM will be of interest to many Apple users. For more information find the Journal of the ACM at your library or write to the address listed below.

11 W. 42nd St. 3rd Floor
New York, NY10036
212-869-7440

Asterisk The asterisk (*) symbol represents the multiplication sign in most BASIC languages such as Applesoft BASIC and Integer BASIC. In Machine language the asterisk is the prompt which appears on the screen in a position immediately to the left of the cursor to signify that the Apple Computer is in the monitor programming mode.

Astro Word Search: French* Three programs that help improve your French vocabulary. The hidden words are common French words. 32K. Program Design, Inc.

Astro Word Search: Spanish* Three programs that help improve your Spanish vocabulary. The hidden words are common Spanish words. 32K. Program Design, Inc.

Astroapple* An astrology program that offers Natal Horoscopes, which are birth charts that give personality and emotional behavior data, and Thirty Day Forecasts, which tell you what days are good for business. 32K; disk or cassette. The Software Factory.

Astrofire* A device which plugs into the Apple computer's game I/O socket and gives the user the option of using rapid fire when he holds down the firing button on a joystick or other game controller. This device has a piggyback socket and plug which accomodates the plug from a game controller or joystick. A small IC board with a switch and a single IC is wired to the plug. When the switch is centered, normal firing is obtained. When the switch is thrown to either side of the center, the user gets rapid fire. Kraft Systems Company.

Astro-Mapping* Lists geographical coordinates where natal planets would be on the horizon or meridian so that you can plot them on a map. AGS Software.

Astronomy* Introduction to the study of stars and constellations. Presents the movements of the Zodiac, displays constellations in graphics, and gives celestial coordinates. Educational Courseware.

Astronomy—Planets* An accurate, high-resolution, color graphic representation of the planets and their orbits. Exercises are included to demonstrate concepts in rotational speed, orbiting distances, and Kepler's Law. The program will also figure opposition, conjunction, and other interplanetary geometries. 48K; disk. Educational Courseware.

Astronomy I—Introduction to Stars* A beginning tutorial on the subject of astronomy. Includes discussion of the constellations Orion and the Big Dipper; the star Polaris; meteors and satellites; declinations and ascensions; and information about the stars and their motion, including the Sun. 48K. Educational Courseware.

Astronomy II—Studies of 25 Constellations* Includes four sections, three that teach constellations, and the last which tests students on the constellations and stars. 48K. Educational Courseware.

Astronomy #1* A selection of 400 general information questions on the subject of astronomy. They include true/false, short answer, fill in the blank, and multiple choice formats. 48K. Academic Hallmarks.

Astroscope* Is used by professional astrologers to cast accurate horoscopes—a licensing agreement is necessary for commercial use of its output. It produces a complete chart in a 1,500-word report. The program comes on two disks (program and text disks). 48K; 2 disk drives and printer. AGS Software.

Astro-Scope* As each planet is studied by Sign, House and Aspect, this program will cast a horoscope and will correctly list the positive and negative stresses in your character as derived from the symbolism of planetary interactions at the moment of your birth. 32K. Matrix Software.

Asynchronous An event or device which does not have the same timing as the central processing unit.

AT A reserved word in Applesoft BASIC which allows a short cut to be taken in statements dealing with high-resolution and low-resolution graphics. For example, the statement DRAW 1 AT 25, 35 instructs the computer to draw shape 1 from the shape table currently in memory at the location where X=25 and Y=35 on the high-resolution graphics screen of the Apple Computer.

The statement HLIN 5, 12 AT 35 instructs the computer to draw a horizontal line from the location X=5 to X=12 at the point where Y=35 on the low-resolution graphics screen of the Apple Computer.

The statement XDRAW 5 AT 100, 90 instructs the computer to erase shape in the current shape table in the computer's memory from the high-resolution graphics screen at the screen location where X=100 and Y=90.

The statement VLIN 22, 42 AT 19 instructs the computer to draw a vertical line between Y=22 and Y=42 at the point where X=19 on the low-resolution graphics screen of the Apple computer.

Atari A prominent manufacturer of microprocessor based games and personal computer systems.

ATE Automatic Test Equipment.

ATN In Applesoft BASIC, the command ATN instructs the computer to return in radians, the arctangent of the angle in parentheses. ATN (60) returns 1.55413 radians.

Atomic Structure* A nine-program set for indepth ventures into the atom. Programs For Learning, Inc.

Atoms* Designed for junior high students, this program presents the atomic components, neutrons, electrons, protons, atomic number and weight, electron configurations, and atomic mass. 48K. J & S Software.

AT&T American Telephone and Telegraph.

ATTACH In CP/M and MP/M, ATTACH is a command which instructs the computer to attach a console to a program which was detached from the same console. The command might look like:

```
ATTACH BOOT 1
```

This instructs the computer to reattach the program BOOT 1 which has been detached with a CTRL-D while the program was running.

Attendance* School administration can keep accurate records on individual student's attendance and tardiness. Each absentee may be marked excused or unexcused on a daily basis or for each period. Charles Mann & Associates.

Attendance Recorder* The attendance of up to 1,000 students can be recorded and written to any of six reports. Student information may also be recalled to analyze class performance and attitude. A systems manual and a reference manual are included. Scott Foresman & Co. Electronics Publishing.

Attendance Reporting System* A school administrative system for keeping accurate and up-to-date attendance records. For use in schools of any size, and designed to be used by clerical staff with no computer training. Various reports can be generated, and the package includes good documentation and user instructions. 64K; printer. Educational Services Management Corp.

Attenuation The reduction in strength of an electrical impulse. Arithmetic unit. See Arithmetic Logic Unit.

Attributes In CP/M, a file may have any one of four attributes which determine how the file may be used. These attributes are R/O for Read-Only; R/W for Read/Write; SYS for a system file which may not appear in the directory; or DIR for a directory file which may not have a system attribute at the same time it has a directory attribute.

Audex* Create sound for your Apple to go with BASIC or Assembly language programs. You can create music and even voice sounds. The utilities include Draw a Sound, Excerpt a Sound, Build a Sound, and Audio Opcodes. Comes with an instruction manual to help the user achieve the desired results. 48K; DOS 3.3. Sirius Software.

AUTO In Integer BASIC, the AUTO command instructs the computer to automatically number the program statements each time RETURN is pressed. For example, if you enter the following statements, CTRL-X gets the user out of AUTO:

```
AUTO 5
PRINT "HELLO"
PRINT "WHAT IS YOUR NAME"
INPUT N$
PRINT "HELLO"; N$
END
CTRL-X
```

Then, if you enter LIST, the computer will print:

```
5 PRINT "HELLO"
10 PRINT "WHAT IS YOUR NAME"
15 INPUT N$
20 PRINT "HELLO"; N$
25 END
```

Auto Atlas* A tool for planning a cross country trip that gives you information on the cost of gas, interstate routes, driving time, points of interest, and distance. Some features of the program are: interstate highway identification; capitals, populations, areas and largest cities; time and cost computations; and print-out of summary information. 48K. Computer Programs Unlimited.

Auto Digisong Player* You can pre-program tempo, timbre, and other musical parameters for automated performances of compositions. You may also use this as a "recital" of the compositions that students made with Music Composer. 48K. Micro Music, Inc.

Auto Graphics* Choose from five colors and several fonts during your creation of characters or text. The output print is twice its normal size. 48K. Southwest Edpsych Services, Inc.

Auto Plot* Includes Auto Plot Printer Control Card and interface cable. Provides functions similar to the standard Apple card plus the printing of hi-res graphics with a single keystroke. With proper input parameters, you can print the hi-res display in three heights or twelve widths, indented, rotated 90 degrees, with two separate displays side by side, or placed in the middle of the text. The hardware can operate as Apple P1 or P9 PROM firmware. Micro Peripherals, Inc.

Auto Records* Records and organizes the information available on the operation of your automobile or truck. This includes lender, insurance agent, monthly, yearly, and cumulative totals, tax deductions, and other analysis on up to twenty-eight vehicles. Johnny Appleseed Software and Company.

Auto Rental Management System (A.R.M.S.)* Helps gather data, and keeps a record of car use. Whether you rent or own a business vehicle, the data gathered can help make cost effect decisions on its future use. 48K; requires 16K RAM card, Applesoft, and printer. Computer Research, Inc.

Auto-Cat* A low cost, auto answer, direct-connect modem that is approved by the FCC. Auto-Cat will give you twenty-four hours of answering service and data communication. When the business executive is on vacation, Auto-Cat will let him "talk" with his computer, and computer enthusiasts can access their computer by phone from any location. Auto-Cat is compatible with any Bell 100 series modem. The low-profile case fits under your telephone, and all controls are easily accessible. Power supply plugs directly into wall sockets. Novation, Inc.

Automaniac System, The* If you want your computer to run everthing in your house, you will need, in addition to this program, a BSR-type interface card and the appropriate modules to control the various appliances. If all you need is a particular program to run a certain time, you only need the disk drives, a clock card (7 different clock cards are compatible with the program), and the computer plus Automaniac. The program allows you to set up an event list, which may contain all single events, or ones which recur at set intervals. It also contains a module called the Execumaniac System, which will let you save information in the form of text files which may later be used by programs started by the Automaniac system.

The only restriction is that your computer must have the power on in order for the program to run; the documentation suggests that you think of your system in the same terms as a mainframe, which runs twenty-four hours a day, and automate all functions possible so that you have more time to be productive at other things. The Geegery Software Works.

Automated Building Directory System With Direct Telephone Dialing* Provides complete listings of occupants, emergency numbers, and other important numbers. Some of the features are auto-dialing, multi-language support, building security, multiple terminals, flexible editing, fast access data, and custom graphic screen. Computer Applications, Inc.

Automated Chart Service* A chart service system that accepts many sets of birth data and performs varied jobs for each chart. You enter as many jobs as you want, with all the options, and the M-65 will produce an unlimited number of charts. Each one has its own series of jobs. A workhorse, good for the high-volume bookshop, or as a regional chart service. 32K; 48K system. Matrix Software.

Automatic Line Numbering A feature of the Integer BASIC language which instructs the computer to automatically number each line of a program as it is written. For example, AUTO 100, 5 causes the computer to commence numbering at line 100 with increments of 5 between lines. The LIST command would display:

```
100 PRINT "HELLO"
105 PRINT "WHAT IS YOUR NAME"
115 PRINT "HELLO"; N$
120 END
```

Automatic Repeat The Apple III and Apple IIe computers are equipped with an automatic character repeat feature when a key is pressed for longer than one-half second. When a key is held down for longer than this period, repeating characters are generated at a rate of eleven characters per second until the key is released. If the Closed Apple key on the Apple III is pressed while the automatic repeat feature is being used, the characters are generated at a rate of thirty-three characters per second (high-speed repeat).

Auto-Modem* Auto-Modem permits "turnkey" use of D.C. Hayes Micromodems. User can select from the menu: auto-dialer; auto-answer; auto-caller; auto-message; self-test; file maintenance; or quit. Auto-dialer can be used for keystroke dialing of bulletin boards or any system that has modem capacities. Auto-answer lets new users get acquainted with the modem without typing up a bulletin board or spending money on connect time. The user can leave his system and receive calls from another modem. The Apple will page the user with a series of beeps, let the caller know he has made a connection, and ask for the name of the incoming caller. 48K; DOS 3.3. Computer Stations, Inc.

Autostart ROM The Apple II+ system was the first Apple Computer to offer the Autostart ROM which, in its purest sense, is the Autostart monitor ROM. This ROM is a standard feature of that computer. It causes the computer to start up in Applesoft BASIC when it is turned on rather than loading language from disk or accessing the resident language from the system monitor.

By having this ROM in the computer, the user has the ability to use the "I", "J", "K", and "M" keys in conjunction with the ESCAPE key to edit programs, by allowing free cursor movement on the screen without adding or removing characters from the computer's memory. It also provides the ability to stop a program being listed on the screen by pressing CTRL-S. Finally, it allows the user to return to Applesoft BASIC whenever RESET is pressed.

On the Apple II Computer with Integer BASIC in ROM, pressing RESET places the user in the system monitor. With this computer, when power is turned on, the user sees a monitor prompt (*) on the screen with the cursor immediately to its right. To access Integer BASIC, he must press CTRL-RESET-B followed by return. This places the Integer BASIC prompt (>) on the screen.

AutoTerm* A terminal and communications program that is upper case, ABBS-oriented, and has an auto-dial feature for up to 25 systems. Other features include an auto-capture mode with a 20K buffer, an editor function, and the ability to set up a Micromodem card in its remote terminal configuration. Machine Code; disk. Requires a modem. Softworks, Inc.

Aux Use to hook up cassette tape. Information on cassette tape is scattered through several Apple manuals. One common cable used for the cassette has a large round pin connector, like the keyboard's connector, on one end. The other end splits into two connectors. One is a miniature phono jack that fits in the "mic" opening of your cassette. The Apple puts out information through this for the cassette to record as if it were a microphone when you "SAVE" a program. The other connector is a standard RCA plug that must be adapted to the "earphone" outlet of your cassette. When you "LOAD" a program, the cassette plays its information into the Apple as if the Apple were an earphone.

There is a small black "jumper" on the center of the back edge of the Apple's motherboard which controls cassette output. It is labeled P4, and has two pairs of front and back pins labeled M (for Microphone) and A (for Auxilliary). Check this jumper and move it to the A (rightmost) pair of pins if necessary. It is very difficult or impossible to get the cassette to work with "MIC" output.

CAUTION: You could damage your cassette player if you get the Apple's jumper for Aux, then plug the cable into "MIC". Always use Aux.

AUX: Reserved Device Name to DOS. Stands for the Asynchronous Communications Adapter port.

AUX I/O ERROR DOS Error Message. While using the Asynchronous Communications Adapter, an input or output error occurred.

Auxiliary RAM The Apple IIe computer uses an auxiliary slot with 60-pin access for installation of optional video and memory expansion. Video expansion alone can be installed in this slot for 80-column display capabilility. Combined memory and video expansion may also be installed. The memory can be expanded up to 192K with a Saturn memory video/expansion card. Apple Computer sells a 64K Auxiliary RAM card for installation in this slot. When the latter card is installed, 1K is reserved for 80-column video display. In the 40-column mode, the entire 64K of expanded RAM is available for data and programs. Auxiliary memory is accessed by bank switching rather than by direct access. There are two Assembly language subroutines available to move memory contents back and forth between the main memory and auxiliary memory. These subroutines are AUXMOVE and XFER. The first instructs the computer to move memory blocks between the two memories. The second is used to move program control between the two memories.

Auxiliary Video Connector Each Apple II and Apple II+ computer is provided with a video connector socket located on the back of the computer on the lower right hand side when the user is facing the front of the computer. This female plug allows the computer to be connected directly to the system monitor. If a standard TV set is employed, rather than a monitor, a radio frequency modulator must be connected to an installation inside of the Apple computer. This device converts the computer's output signal to a signal which a conventional TV set can understand. It is then connected to a slide switch on the back of the TV. This switch allows the user to select the use of the TV as a monitor or as a conventional TV.

AUXMOVE An Apple IIe memory management subroutine which allows the user to move the contents of memory blocks in the main memory to a location in auxiliary memory and vice versa. The data addresses of the blocks to be moved must be stored in page zero prior to moving memory contents. The carry bit must also be set to indicate to the computer that the contents must be moved to auxiliary memory or to main storage. If this bit is set (equals 1), the specified contents of the main memory will be moved to the specified address in auxiliary memory. If this bit is clear (equals 0), the reverse will occur.

AV AVailable.

AVAR Abbreviation for Arithmetic VARiable.

Aviculturist III* A program for testing on state (U.S.) and world capitals. Features include test evaluation and a function for the user to generate customized tests. Requires controller card. American Avicultural Art & Science, Inc.

AXBI Apple Extender Board* Use this board to raise the peripheral cards up from the original position in the computer to make it easier for troubleshooting. SSM Microcomputer Products.

AXE (Apple Extended Editor)* The Advanced Extended Editor greatly improves the line editing of the normal Apple editor. Some of the notable features are search and replace, auto line numbering, and listing controls. Macros allow common key word entries to save time when writing programs. AXE requires 3,300 bytes of memory and does not support an 80-column card. 48K. Versa Computing.

AZ-ED1 Whole Brain Spelling* A spelling package that utilizes visual reinforcement (as opposed to word memorization) to teach both sides of the brain to "see" the word. Includes color highlights, drawings, and a 200-word list of easy-to-difficult exercises. 48K; disk. Sublogic Communications Corporation.

A2-GE1 Graphics Editor* A graphics editor for use withthe A2-3-D1 Animation program. It simplifies the construction of 3-D objects for display on the Apple and also lets you program movement of a number of 3-D objects at the same time. The program is now being offered along with the A2-3-D1 3-D Animation Program in a single package. 16K, cassette; 32K, disk. Sublogic Communication Corp.

A2-3-D1 3-D Animation Program* An Assembly language program which allows the user to build and project 3-D graphics scenes on a monitor hooked up to an Apple II or Apple II+ computer. The graphics animation system requires a minimum of 32K in the Apple's memory, but may be upgraded to 48K. Programs for Integer BASIC and Applesoft BASIC are included on the program disk.

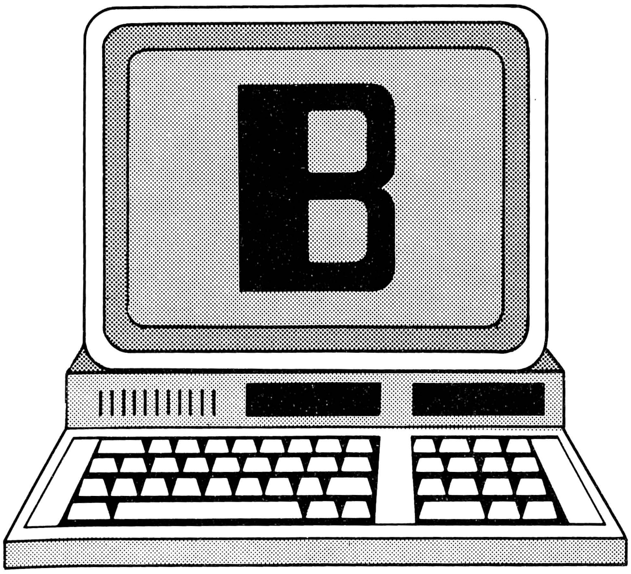
The disk contains a Develop program which lets you view an already prepared scene or create a new scene. The Develop program allows you to view the scene from a variety of points within the 3-D world represented by the scene. You develop scenes by using specific memory addresses to lodge commands that are expressed as hexadecimal numbers followed by X, Y, and Z coordinates.

A starting point is plotted, followed by connected points or ray-generated points. The point of view can be designated by using the EYE command. This point of view may be changed by using POKE statements to provide a sense of motion. A utility program called Orbit lets you view a scene from a number of different angles by automatically instructing the EYE to move through a circle around a particular object or a particular point in a scene. The manual that comes with this program is quite complete, but it is quite technically-oriented (as is the program). The 3-D graphics produced by an experienced user of this program can be phenomenal. Some experience with graphic principles, BASIC programming, and Assembly language programming are required if you expect to use all of the program's capabilities. Sublogic Communications Corp.

A10 Serial & Parallel Apple Interface See AIO Serial & Parallel Apple Interface.

A10-II (Serial & Parallel Interface) See AIO-II (Serial & Parallel Interface).

A800 Eight-Inch Floppy Disk Controller* Enables the Apple to use Shugart/ANSI Standard Eight-Inch Floppy Disk Drives for increased on-line memory with IBM format compatibility. The controller allows access of up to five million bytes of on-line storage through regular Apple DOS commands. Vista Computer Company.



B Codes. ASCII = 66, HEX = 42. b—ASCII = 98, HEX = 62.

b: See B Parameter.

B B is used as an abbreviation for Bytes, when referring to memory; or for BAUD rate, when referring to communications. KB = 1000 bytes or baud (technically 1K = 1024 bytes).

B Bus line. Also: The hexadecimal symbol for the decimal number 11: B base 16 = 11 base 10 = 13 base 8 = 1011 base 2.

B: CP/M keeps an internal record of which diskette drive is currently considered the "default diskette" or "default drive." When you start a CP/M session, the default diskette drive is always A. To change the default diskette drive to B, enter:

B:

or to go back to A as default, enter:

A:

To determine which is the default diskette drive, look at the prompt (A> or B>) to see which diskette is indexed on the screen.

B Parameter Apple's READ and WRITE commands in DOS 3.3 can be used with the B (byte) parameter to read and write information at a specific position within a sequential text file. See Absolute Byte Parameter.

B> Prompt CP/M's way of letting you know which drive is waiting to respond to your command.

A> is a prompt in CP/M if you are working on diskette drive A (the leftmost drive) as the default drive.

B> is prompt in CP/M if you are working on drive B (the rightmost drive) as the default drive.

BABBLE* A programming language similar to BASIC or Pascal, but simpler to program than BASIC. Create stories, poetry, jingles, or graphics as you define the rules for the computer to follow. Includes a full screen editor for cassette or disk files. 16K; cassette, 32K; disk. The Software Factory.

Backplane Also called a motherboard, it is the physical area in a system where the boards plug in. It usually contains the buses of the system in either printed circuit or wire-wrap form.

Backslash In Apple's Integer BASIC language, the PRINT command will only print about 100 characters on the screen before another line containing a PRINT command is required. If the programmer enters more than 100 characters in quotes for PRINTing by the computer, it returns a "TOO LONG ERR" message. If he continues to add characters and exceeds 240 characters, the computer beeps and displays a backslash \ at the end of the text being typed.

On the Apple II, Apple II+ or Apple IIe computers, with Integer BASIC in firmware or accessed from the language card, a backslash generated by pressing CTRL-X at the end of a program line instructs the computer to ignore the line. When the computer encounters this symbol, the line preceding it will not be stored in memory.

Backspace The cursor is a blinking square which appears on the screen to let you know where an action (such as typing in a character, deleting, inserting, etc.) will take place. The cursor moves to the right as you type, backs up to the left when you press the left arrow, ESC-J, or ESC-B keys. Backspace erases the characters from the screen as the cursor moves left when using the left-arrow key on the Apple II and Apple II+. On the Apple IIe the delete key backspaces and erases. On the Apple III, using the left arrow to backspace removes characters touched by the cursor from memory.

Backup See Backup a Copy of a Diskette and Diskette—Backup.

Backup a Copy of a Diskette With the Apple computer it is very easy to make a backup copy of any disk which is not copy protected by various commercial protection techniques. The diskettes which are not protected by copyrights and sophisticated electronic techniques usually contain programs you have written yourself or public domain software which may be copied and distributed freely. The Apple DOS 3.3 System Master Diskette contains a program called Copy A which is written in Applesoft BASIC. This program enables the user to copy any unprotected diskette in its entirety. The program will read and write to the same disk drive if required, with much swapping of the original and copy disk. It will also read from one disk drive and write to another. The System Master also contains a similar program written in Integer BASIC called Copy. This program does the same thing as COPY A. A third program on the same disk allows the user to copy single programs or files, or to copy the entire disk. This program is written in Machine language and is called Fid. Fid can copy an entire disk by using the COPY FILES option and using the equal sign (=) as a wildcard character when the file name is requested. A fourth COPY program called Muffin is on the same disk. This program converts files and programs stored on DOS 3.2 initialized disks to DOS 3.3 programs and copies them onto a DOS 3.3 initialized disk.

If you are using CP/M on your Apple computer and wish to copy a file or program from one disk to another, a utility program called Discopy may be used. This program formats the disk to which the file or program is being transferred and then copies the material. It only allows the copied material to be directed to drive B. Discopy is menu-driven. Option 2 formats the disk on drive B and copies the operating system from the disk on drive A to the disk on drive B. Option 3just copies the operating system without formatting the destination diskette. Option 4 verifies formatted disks to ensure that they will accept data properly, Option 5 exits the program. Another CP/M program which is used for copying files or entire disks is Wash.

Another common CP/M copy program is PIP which stands for "Peripheral Interchange Program." This program enables the user to do one or more multiple copy operations. See PIP.

A number of commercial programs are available which can copy protected software. Most of these programs are nibble copiers which allow the user to set various parameters which disable copy protection techniques. Some of these programs continue trying to make copies but the user is not allowed to adjust parameters. Instead, the program does this. Locksmith, Nibbles Away, Super Disk Copy III, and Copy II Plus are examples of such programs.

A few hardware devices are available to copy protected programs. The Wild Card is an example of such a device. This device captures a copy of the software while it is running. After this has been done the user can either restart the program or copy to a disk other than the program disk. The software and hardware described above for copying protected software is intended for archival use, not for copying software for sale or for distribution. All manufacturers either supply backup copies or programs upon purchase or by mail upon presentation of proof of purchase, sometimes for an additional fee.

Backup Copy A duplicate copy of a program diskette or data diskette which is made in case the original program diskette or data diskette is damaged. Backup copies should be stored in some location away from the original. The location should be dust free, not too hot, not too cold, and should not be near any magnets, X-ray machines, etc.

Backup Diskettes & Adhesive Tabs Diskettes used to hold backup copies of programs or data are standard diskettes which have been initialized to conform with the operating system in your computer. They must be initialized by DOS 3.2, DOS 3.3, Pascal, or the CP/M system you are using. Once copies are made, adhesive tabs should be affixed over the write protect notch on the disk to prevent the back up material from being overwritten. These backup disks should be clearly labelled by writing up a label prior to putting on the disk, then affixing the label to the disk. If you must write on a label already fixed to a disk, use a felt-tip pen and write softly as the magnetic media can be damaged. Backup copies should be stored in a protected, dust free place, far from magnets.

Backup of Diskettes Because diskettes can be rendered unreadable by physical damage, magnetic contamination, or dirt, it is wise to keep at least two copies of any important information. All of the programs described above such as Copy A, Copy Fid, Muffin, etc. may be used to make such backups.

BAD BRANCH ERR Integer BASIC contains a number of error messages which assist the programmer by indicating that there is a particular type of fault in his program. The error message "***BAD BRANCH ERR" on the screen indicates that the programmer instructed the computer to GOTO a line number which did not exist in the program or GOSUB to a subroutine located at a line number which did not exist in the program. The program is interrupted when this type of error occurs. Then the error message is printed on the screen. This error often occurs when the user is typing a program from some printed source and inadvertently forgets to enter a line. The program cannot be resumed until the error is corrected.

BAD NEXT ERR Integer BASIC error message. When "***BAD NEXT ERR" appears on the screen, it indicates that the program cannot execute any further because the computer has encountered a program line containing a NEXT statement (used with LOOPS) which does not refer back to a previous FOR statement (instructs computer on the number of iterations to perform). If properly written, a program would look like the example below.

```
105 FOR Z= 1 TO 12
110 PRINT Z
115 NEXT Z
```

If line 105 was missing the program would stop and "***BAD NEXT ERR" would appear on the screen.

BAD RETURN ERR Integer BASIC error message. "***BAD RETURN ERR" is displayed when a program encounters a RETURN instruction at a point in a program other than at the end of a subroutine which the program was executing as the result of a GOSUB instruction. The computer ceases execution of the program when it encounters the extra RETURN instruction. The only way to correct this error is to list the program and remove the extra RETURN.

Bad Sector A sector on the diskette which will not read/write data correctly. Usually due to a minor physical flaw in the diskette. One or two bad sectors will not seriously affect the diskette's use—DOS will mark them as bad and avoid using them. More than a few bad sectors, however indicates the diskette should be used as a frisbee rather than to hold your valuable data.

BAK File Extension. This is one of several extensions used in CP/M. It is commonly added to the name of a file created and saved for back up purposes. See File Name Extension.

Bank Usually 64K of memory.

Bank Account Manager* A tool for the establishment of a financial organization program. Works well with bank accounts, groceries, utilities, and other data. Educational Computing.

Bank Select Also called Bank Switching. A method of extending a computer's RAM memory. Each bank responds to the same addresses, but only one is active at a time.

Bank Street Writer, The* An easy-to-use word processing system designed specifically for young writers. It can help students not only develop writing, speaking, and reading skills, but computer familiarity as well. Scholastic, Inc.

Bank Switching Bank switching describes the process by which a computer utilizes additional blocks or "banks" of RAM. Bank switching is used to bypass a certain segment of the computer's memory and to substitute an amount of memory external to the system to store and retrieve data or programs. The Apple II and the Apple II+ computers use bank switching to access memory in excess of 64K. The Apple IIe uses the same system. The 12K of memory between $D000 and $FFFF (52K to 64K) is normally used for the monitor and the Applesoft BASIC Interpreter. The memory space is also used during operations which access external memory and access 16K of internal memory by switching the signals which are normally sent to and from these memory locations to locations in external memory. The external memory is given the same address as the internal memory, but access to the external memory is gained by using "Bank Select Switches" which allow or inhibit the use of specific memory banks. The 12K of memory described above is treated as 16K of memory by doubling up the utilization of the 4K of space between $D000 and $DFFF which is the lower 4K of the 12K space described above. This space is also accessed by bank switching.

RAM expansion cards are accessed in the same fashion and use the same process of turning bank select switches on and off to make the computer think it is addressing the upper 12K of RAM when in truth it isn't.

Banker's Construction Loan Reporter* A program to assist the banker handling construction loans. It will help keep track of important information on budgeting, cost, and scheduling. Input key data to make projections and comparisons on construction jobs. Computerized Construction Management Systems.

Banner Magic* Invent personalized message-streamers with seven-inch letters. Gives parties and picnics an extra special touch. Phoenix Software, Inc.

Banners 1* Select any of three sizes to print long, continuous messages for store display. The characters are large and blocked. 48K. Berlinersoft.

Bar Code The consumer product information code read by an optical wand.

Bar Graph* Nine pieces of data can be plotted at once on this bar graph. Paul's Electric Computer.

Bar/Bat Mitzvah Training* Young men and women can teach themselves the Hebrew and English transliterations combined with music. Phrases may be repeated as many times as necessary in preparation for the celebration into adulthood. 48K. Institute for Computers in Jewish Life.

BAS File Extension. In CP/M, file names are often given extensions to signify that the file is a BASIC source file. The use of such extensions allows the CP/M user to use the same name for several files which operate in a different fashion or do different things. The user should remember BASIC programs in CP/M are interpreted as source files rather than RUN directly from DOS. Source files are run by the BASIC interpreter, which is a program run by DOS.

BASE Alternate business name of Bay Area Systems Engineering—The originators of the IBM PC Reference Encyclopedia, the Apple User's Encyclopedia and other similar reference works for the personal computer user.

Base Register The register which contains the longer part of a two-part Assembly language address. The smaller part, called the displacement or offset, is contained in the Assembly language instruction. The data that the instruction is to operate on is located at the "effective address"—the byte of memory whose address is the sum of the number in the specified base register and the offset number given in the instruction. This method of specifying addresses allows data to be located with fewer bits than with a full, explicit address.

BASF Badische Anillin und Soda Fabrik. A manufacturer of magnetic storage media including diskettes.

BASIC Beginner's All-purpose Symbolic Instruction Code. A popular computer language invented at Dartmouth for educational purposes and now on almost all microcomputer systems. Similar to the FORTRAN programming language, it is easy to learn and use. Some BASICs have just the bare essentials of regular BASIC, which is a form of Dartmouth original BASIC. Super BASICs may have features from other languages. Compatibility problems between various BASICs do exist.

BASIC—Delete Program Lines. To delete program line 100 enter:

```
DELETE 100 or just 100
```

To delete program lines 100 to 200 enter:

```
DELETE 100-200
```

To delete all program lines up to 100 enter:

```
DELETE 0-100
```

To delete program lines from 100 on with DELETE you must specify the final line number. If you want to delete lines to the end of your program, either LIST to find the last line number or enter a dummy line at the largest possible line number—65529. Then enter:

```
DELETE 100-65529
```

a dummy line might be:

```
65529 END
```

BASIC—From or To DOS On Apple computers, DOS is accessible from Integer BASIC and Applesoft BASIC as long as the system master has been loaded when the computer is turned on. It is also accessible if the disk which is being loaded has the DOS image within its HELLO program. A utility file called Master Create is available on the System Master Diskette for DOS 3.3 to place this image on the program.

In CP/M the versions of BASIC such as CBASIC, MBASIC, BASICA, etc. available on the CP/M disk must be loaded into the system prior to loading and running any programs written in BASIC. For instance, type:

```
CBASIC
```

and press RETURN to load CBASIC into the system. Then:

```
TEST
```

and press RETURN executes the program if it was written in CBASIC. Another method would be to type:

```
CBASIC TEST
```

and press RETURN to cause the computer to load CBASIC and execute TEST.

BASIC—Display Program Lines To display all program lines for a program currently in memory enter:

```
LIST
```

To display program lines from start up to line 100 enter:

```
LIST -100
```

To display program lines from line 100 to end enter:

```
LIST 100-
```

To display program lines from line 100 to line 200 enter:

```
LIST 100-200
```

To display program line 100 only enter:

```
LIST 100
```

To freeze the list so you can read it while it is being displayed, press CNTRL-S (Applesoft BASIC).

BASIC—Largest Line Number The largest possible line number for a BASIC program is 65529.

BASIC—Listing Files or Programs on Diskette In Apple DOS 3.3, to list the names of those files or programs which are stored on disk, enter "CATALOG

S6,D2" for the disk on Drive 2 in slot 6. To get back to the default drive (drive 1), enter "CATALOG, S6, D1." This DOS command causes the computer to go out to the disk on the specified drive, read its catalog, and print to the screen information regarding the programs on the disk.

In CP/M, the default drive is catalogued by typing DIR followed by RETURN. Thus, if you were using drive A and typed "DIR" the list of files and programs on the disk on drive A would be displayed on the screen. To obtain a directory of drive B, you would type Dir B; after the system prompt. This would look like the example below:

```
>A: DIR B (RETURN)
```

BASIC—LOAD Instructions To load a program which has been saved to disk on DOS 3.3, the user must type LOAD followed by the program name. An example might be LOAD BAR GRAPH. If this program is stored on a diskette on drive 1 and this was the disk drive last accessed, the program will be loaded into the computer's memory. When the loading process is completed, a flashing cursor appears under the command LOAD BAR GRAPH. The program can then be listed out on screen by entering LIST. The program can be run by entering RUN. If you wish to load a program from another drive you would type LOAD BAR GRAPH, S6, D2 or LOAD BAR GRAPH, S6, D2 or LOAD BAR GRAPH S5, D1, etc.

In CP/M there are two options for loading programs. The first loads and executes a program. The second converts a .HEX file into a .COM file. In the first case the name of the file you wish to execute should be entered immediately after the CP/M prompt which shows the active disk drive. The prompt A> is on the screen when drive A is active. B> is on the screen when drive B is the default drive. For example if you enter COPY after the A prompt and the program copy is on that disk drive, it will be loaded and executed. If you type B: COPY after the prompt, the program on the disk in drive B will load and execute. The transient program LOAD is included in CP/M system disks. This program converts a .HEX file on disk into a .COM file. The .HEX file is one which has been compiled with an assembler. The .COM file is a command file written to perform a particular function such as COPY or CONFIGURE.

BASIC—NEW Programs Erasing Old Program Lines. To start a new program type:

```
NEW
```

This completely erases all lines now in the computer's memory, so if its something you want to keep and haven't already got on diskette, SAVE it first. If you don't erase the program in memory before starting on another, you will usually wind up with an unusable combination of mixed lines from your old and new programs.

BASIC—Prompts There are two BASIC language prompts available on the Apple computer. These prompts appear on the left hand side of the screen and signify which language is currently being used. The prompt for Integer BASIC is the greater than symbol (>). The prompt for Applesoft BASIC is the right bracket (]).

BASIC—Reserved Words Uses & Restrictions Each version of BASIC on the Apple computer uses specific alphanumeric character combinations as commands. Some commands are abbreviations. Others are whole words. The BASIC Interpreter uses these commands to convert instructions written in BASIC into Machine language instructions which the computer understands. The abbreviations and words used in this fashion are called "Reserved Words." Unless these words are enclosed in parentheses in program lines, the computer attempts to execute the instructions they represent. Any variable name which contains a reserved character sequence will be misinterpreted—so take care not to use them. The following words are reserved words in Integer BASIC:

ABS
AND
ASC
AT
AUTO
CALL
COLOR=
CON
DEL
DIM
DSP
END
FOR
GOSUB
GOTO
GR
HIMEM
HLIN
IF
IN#
INPUT
LEN
LET
LIST
LOAD
LOMEM
MAN
MOD
NEW
NEXT
NOT
NOTRACE
OR
PDL
PEEK
PLOT
POKE
POP
PRINT
PR#
REM
RETURN
RND
RUN
SAVE
SCRN
SGN
STEP
TAB
TEXT
THEN
TO
TRACE
VLIN
VTAB

The following words are reserved words in Applesoft BASIC:

ABS
AND
ASC
AT
ATN
CALL
CHR$
CLEAR
COLOR=
CONT
COS
DATA
DEF
DEL
DIM

DRAW
END
EXP
FLASH
FN
FOR
FRE
GET
GOSUB
GOTO
GR
HCOLOR=
HGR
HGR2
HIMEM
HLIN
HOME
HPLOT
HTAB
IF
IN#
INPUT
INT
INVERSE
LEFT$
LEN
LET
LIST
LOAD
LOG
LOMEM
MID$
NEW
NEXT
NORMAL
NOT
NOTRACE
ON
ONERR
OR
PDL
PEEK
PLOT
POKE
POP
POS
PRINT
PR#
READ
RECALL
REM
RESTORE
RESUME
RETURN
RIGHT#
RND
ROTZ
RUN
SAVE
SCALE=
SCRN (
SGN
SHLOAD
SIN
SPC (
SPEED=
SQR
STEP
STOP
STORE
STR$
TAB (
TAN
TEXT
THEN
TO
TRACE
USR
VAL
VLIN
VTAB
WAIT
XDRAW

The following reserved words are used by Apple Business BASIC on the Apple III:

A
ABS
AND
AS
ATN
C
CHAIN
CHR$
CLEAR
CONT
CONV
CONV %
CONV &
CONV $
COS
DATA
DATE $
DEF F
DEL
DELETE
DIV
END
EOF
ERR
ERRLIN
EXFN
EXFN %
EXP
FN
FOR
FRE
GET
GOSUB
GOTO
HEX $
HOME
HPOS
IF...ELSE
IF...GOTO
IF...THEN
IMAGE
INPUTSIN
INSTR
INT
INVERSE
INVOKE
LEN
LET
LEFT $
LIST
LOAD
LOG
MID $
NEW
NEXT
NORMAL
NOT
NOTRACE
NONEOF #
ONERR
ON...GOSUB
ON...GOTO
ON RBD
OFF EOF #
OFF ERR
OFF KBD
OR
PERFORM
POP
PREFIX $
PRINT
PRINT USING
READ
REC
REM
RESTORE
RESUME
RIGHT$
RND
SAVE
SCALE
SGN
SPC
SQR
STOP
STR$
SUB$
TAN
TEN
TEXT
TRACE
TYP
VAL

BASIC—Special Characters The following characters have special significance or application in Integer BASIC and Applesoft BASIC. They must be used in the fashion described or the results of their use will be invalid—and probably upsetting.

CHARACTER	USED IN APPLESOFT	USED IN INTEGER	DESCRIPTION
	yes	yes	blank space
+	yes	yes	plus sign, arithmetic operation.
/	yes	yes	slash or division symbol.
—	yes	yes	caret or exponentiation symbol.
%	yes	no	percent sign in Applesoft signifies integer or string variable.
$	yes	yes	dollar sign—in both BASICs, a string indentifier.
&	yes	yes	ampersand—a symbol reserved for internal use by computer. When encountered in a program, it causes an unconditional jump to $3F5 in memory.
;	yes	yes	semicolon—indicates that print statements should be joined with no spaces between output on the same line.
?	yes	yes	question mark—prompt from computer when a program line calls for input.

CHARACTER	APPLESOFT	INTEGER	DESCRIPTION
”	yes	yes	double quotation marks—sets aside material to be printed by a PRINT statement.
(	yes	yes	left parentheses—divides portions of mathematical expressions to preserve proper precedence.
)	yes	yes	right parentheses—divides portions of mathematical expressions to preserve proper precedence.
=	yes	yes	equal sign—mathematical operator, DOS operator signifying copy all material (wild card symbol).
-	yes	yes	minus sign—mathematical operator.
□	no	yes	back slash—error indicator, instruction to erase from memory.
*	yes	yes	asterisk—mathematical times operator, monitor prompt, CP/M wild card character.
#	yes	yes	number symbol or pound sign—in Integer this symbol is used to instruct the computer to compare two strings for inequality; in both it is used as a symbol to alert the computer to look for input from or output to a peripheral.
!	no	no	exclamation point-Assembly language prompt.
,	yes	yes	comma—used to divide printed output on same line by placing the first item in the first available field, the second item in the second available field, etc.
:	yes	yes	colon—used to separate distinct program steps written on the same line.
<	yes	yes	less than—arithmetic logic operator.
>	yes	yes	more than—arithmetic logic operator.
’	yes	yes	single quote—used to signify use of quotes within double quotation marks of print statement.
]	yes	no	right bracket—language prompt.

BASIC—Statements Cross-referenced by Function. The following functions are listed followed by the BASIC command which executes the function and the languages which use the function.

I = Integer BASIC
A = Applesoft BASIC
B = Apple III Business BASIC

STATEMENT	VERSIONS		
	I	A	B
Absolute value or number returned—ABS(<x>)	*	*	*
Arctangent—ATN(<x>)	-	*	*
Arrays—DIM <variable> <subscripts> and OPTION BASE (<n>)	*	*	*
ASCII codes for characters—ASC(<x>)	*	*	*
ASCII code to characters—CHR$(<n>)	*	*	*
Beep sound emitted by speaker—BEEP	-	*	*
Binary file loaded in to memory—BLOAD	*	*	-
Binary file saved to disk from memory—BSAVE	*	*	-
Branch—GOTO<line>	*	*	*
Branch one statement beyond second NEXT statement—POP	*	*	*
Call BASIC subroutine—GOSUB and RETURN	*	*	*
Chain variables from one file to another—CHAIN	-	-	*

STATEMENT	VERSIONS		
	I	A	B
Change memory byte with BASIC—POKE<n>,<m>	*	*	-
Clear the screen—HOME	-	*	*
Continue program where stopped—CON	*	-	-
Continue program where stopped—CONT	*	*	*
Give system date—DATE$	-	-	*
Decimal to hexadecimal string conversion—HEX$(<n>)	-	-	*
Define numeric function or string—DEF FN	-	-	*
Define numeric function or string—DEF	-	*	*
Delete specific program lines—DELETE	-	-	*
Delete specific program lines—DEL	*	*	*
Dimension arrays—DIM	*	*	*
Diskette, list directory of files—CAT	-	-	*
Diskette, list directory of files—CATALOG(DOS 3.3) DIR(CP/M)	*	*	*
e,powers of—EXP(<x>)	*	*	*
Display minimum or maximum value of variable—DSP	*	-	-
End of File—EOF	-	-	*
End program as program step—END	*	*	*
Erase a file from BASIC—NEW	*	*	*
Erase current BASIC program and variables—NEW	*	*	*
Error code number of last error—ERR	-	-	*
Execute BASIC program—RUN	*	*	*
Exponential—EXP(<x>)	*	*	*
File—erase from BASIC—NEW	*	*	*
Generate line numbers automatically—AUTO[<number>],[<increment>]	*	-	-
Give free space in memory—FRE(<n>)	*	*	*
Integer—convert to by rounding—INT(<x>)	*	*	*
Keyboard, read data from—INPUT[;][“prompt”;]<variable>[,<variable>]	*	*	*
Left justify a string—LEFT$	*	*	*
Length of string—LEN(<x>$)	*	*	*
Line numbers,generate automatically—AUTO[<linenumber>],[<increment>]	*	-	-
Line numbers, renumber—>]	*	-	-
Load binary data (Machine language programs, etc.)BLOAD <filename>	*	*	-
Loop— FOR and NEXT statements	*	*	*
Machine language program, load BASIC—BLOAD <filename>	*	*	-
Machine language program,save—BASIC BSAVE <filename>	*	*	-
Machine language program (subroutine)—CALL <numeric variable>	*	*	*
Memory, amount free—FRE(<x>)	*	*	*
Memory, change—POKE<n>,<m>	*	*	-
Memory, read byte—PEEK(<n>)	*	*	*
Mode, screen, control—TEXT (from graphics screens)	*	*	*
Natural logarithm—LOG(<x>)	*	*	*
NEXT, end of FOR...NEXT loop—FOR <variable>=<x> TO <y> [STEP <z>]...NEXT	-	*	*
Numeric value of string—VAL(<x$>)	-	-	*
Print BASIC program listing on printer 10 PR# (printer slot no.) 20 LIST	*	*	-

STATEMENT	VERSIONS		
	I	A	B
Print on printer—PR# <printer slot number>	*	*	-
Printer—carriage position—HPOS(<n>)	*	*	-
Program, BASIC—run or execute—RUN	*	*	*
Random number—RND(<x>)	*	*	*
Read character from keyboard—INPUT	*	*	*
Read data from file—GET[#]<filenum>[,<number>]	*	*	*
Read data from DATA statment or INPUT#—Read	*	*	*
Repeat a character (n) times—FOR 1 to X: NEXT X	*	*	*
Repeat program lines—FOR <variable> = <x> to <y> [STEP <z>]	*	*	*
Right justify string—RIGHT$	*	*	*
Save binary data—BSAVE	*	*	-
Screen, clear—HOME	-	*	*
Set variable to 0, string to null—CLEAR	*	*	*
Sign—SGN(<x>)	*	*	*
Spaces in PRINT or PRINT—SPC(<n>)	-	*	*
Speaker—BEEP and BELL	*	*	-
Square Root—SQR(<x>)	*	*	*
Stop BASIC program—END	*	*	*
String, left justify—LEFT$(<stringvariable>)	*	*	*
String, length of—LEN(<x$>)	*	*	*
String, numeric value of—VAL(<x$>)	*	*	*
String, right justify—RIGHT$	*	*	*
Subroutine—GOSUB<line>	*	*	*
Subroutine, Machine language—CALL<numvar>[<variable>[,<variable>...]]	*	*	*
Trace off—TRACE	*	*	*
Trace on—NOTRACEPUT[#]<filenum>[,<number>]	*	*	*

BASIC—Variable Names Rules:

1. Rules for Integer BASIC variable names:
   a. First character must be a letter.
   b. In Integer BASIC a variable name may consist of between 1 and 100 characters.
   c. Characters used as the second character up to the 100th character may be either letters or numbers.
   d. If the variable is a string variable rather than a numeric variable, the last character used in the name must be the dollar sign ($) which indicates to the computer that it must seek an alphabetic character string rather than a number.
   e. String variables can be associated with character strings of any length from 0 to 255 characters. Blank spaces are treated as characters when counting the characters in a string. Before a string variable is used in an Integer BASIC program, its length must be expressed for the computer in a string dimension statement (DIM).
   f. Numeric variables in Integer BASIC must lie between -32,767 and +32,767.
2. Rules for Applesoft BASIC variable names:
   a. First character must be a letter.
   b. A variable name in Applesoft BASIC may consist of only 1 to 3 characters.
   c. The second character may be a letter or a number.
   d. If the variable is a real variable (any whole or fractional number where the fraction is expressed as part of the number), the third character in the variable name is left blank. The number should lie between -10 to the 38th power and +10 to the 38th power or the computer wil be unable to store it.
   e. If the variable is an integer variable (a whole

number or a fractional number rounded to a whole number to avoid displaying decimals), the third character must be a percent sign (%).

  f. If the variable is a string variable, the third character used in the variable name must be a dollar sign ($). In Applesoft BASIC there is no need to dimension this variable for the computer. The string associated with the variable name used may consist of 0 to 255 characters. Blanks are treated as characters.

3. Rules for Apple Business BASIC variable names:
   a. Variable names may be up to 64 characters long.
   b. Variables may be real numbers.
   c. Variables may be integers.
   d. Variables may be long integers.
   e. Variables may be strings($).
   f. Integer variables may only be five characters long and may only fall between -32,768 and 32,767.
   g. Long integers may be up to 19 numbers in length and may not be mixed in expressions with regular integers or real numbers
   h. Long integers must end with an ampersand (&) and must lie between -9,223,372,036,854,-775,808 and 9,223,372,036,854,775,807.
   i. Real numbers are automatically expressed in scientific notation when they exceed 999,999.2.
   j. String variables must be enclosed in quotation marks. Strings may contain single quotes.

BASIC, Reserved Words Reserved words in any high-level computer language such as BASIC are used by the language's interpreter to convert the instructions given by the high-level language program into Machine language which the computer can understand and act upon. In BASIC, each of these words, symbols, and operators cannot be used as variable names. When they are used in a program line, reserved words must be separated from other characters by a space. See Reserved Words.

Basic Arithmetic Skills* Master the four basic fundamentals of mathematics. Progression is individualized with increasing levels of difficulty. Includes visual and audio effects plus tutorial manual. Grades four to six. Edutech Corp.

Basic BASIC* A fun introduction to Applesoft BASIC with rewards for motivating students. Short quizzes are imbedded within each text page to reinforce learned concepts. The program will also output report for each program usage. 48K. Edutech Corporation.

Basic Chemistry—Semester I* For grades ten and above. This package contains seven lessons: the atom; the Periodic Table; chemical bonds; units and dimensions; the Gas Laws; solutions; and energy. 48K. B L S, Inc.

Basic Chemistry—Semester II* A six program package for grades ten and above. Includes nuclear reactions and equations, equilibrium, oxidation-reduction, electrochemistry, and more. 48K. B L S, Inc.

BASIC Compiler All programs executed by computers ultimately run in Machine language, which consists of the actual numeric instruction code of the computer's central microprocessor chip. In the Apple II, the Apple II+, the Apple IIe, and Apple III computers, this is a 6502 or a 6502A microprocessor. It is a cumbersome and tedious process for all but the most adept and experienced programmers to write programs in Machine language, so the Apple computer contains a PROM which permanently holds and interprets commands given to the computer in Applesoft BASIC or Integer BASIC. Apple Business BASIC (Apple III) is disk loaded. This interpreter converts programs (as they are written) into the numeric instruction code which the computer's central microprocessor understands. Many programs written in BASIC run very slowly (in a relative sense as what is slow to a computer is usually extremely fast to the human user) due to the constant need to convert instructions and responses into Machine language and back into BASIC. A BASIC compiler is a utility program which converts programs written in BASIC to Machine language and stores these converted programs on disk so that they may be loaded and run by the computer as Machine language programs rather than as BASIC programs. The net effect of this process is to speed up the execution of the program (in its compiled version) because of the elimination of instruction and response conversion from and to BASIC. A number of BASIC compilers are available for Apple computers. These programs include Speed Star, CBASIC (interpreter and compiler), Hayden Applesoft Compiler, Integer BASIC Compiler, CBASIC/86, DMA/C, C65, and a number of other compilers.

Basic Ear—Training Skills* Four helpful programs for Music Card MC16 owners: 1) Pitches aids student in differentiating between two varying pitches, 2) Invervals aids a student in recognizing melodic or harmonic intervals, 3) Chords helps students to identify Major, Augmented, and Diminished chords, 4) Scales helps students to identify harmonic minor, melodic minor, whole tone, chromatic scales, major, and natural minor. ALF Products, Inc.

Basic Electricity* This series of three programs calculates current, voltage, and resistance in D.C. circuits. The programs include Series, Parallel, and Network. Requires 48K; DOS 3.2 or 3.3. Programs For Learning.

Basic Electricity* A tutorial covering many electrical concepts. A series of patterns or drawings on the screen will teach and test the student. Requires 48K; DOS 3.2/3.3 and Applesoft. Ideatech Company.

Basic Fiction Skills* Teaches young children about certain aspects of the library. Explains fiction and the spine lettering of books. A game follows using the information demonstrated, with rewards for correct answers. Cassette or disk. Right On Programs.

Basic Individual Retirement Account* Demonstrates advantage of tax-deferred savings program. Computes and displays year-by-year comparison. Also shows contribution from a spouse. RE/International Systems Corporation.

Basic Interactive Terminal Software (B.I.T.S.)* This system will let you use your Apple II and D.C. Hayes Micromodem II or Apple Comm Care/Modem as an intelligent terminal that communicates with other systems over telephone lines at 110 or 300 baud ASCII. The software maintains 32K in a 48K system copy buffer while you are connected to another system. As many as twenty typewritten pages can be stored in a 32K buffer. If a file is larger than 32K it can be transferred a piece at a time. There is capacity for transferring text files on your disk to another system. Some features are: Applesoft autodial program; a program to maintain the auto dial library; file transmit capacity; and line formatting. Micro Software Systems.

BASIC Interpreter All programs which run on the Apple computer are converted to Machine language numeric instructions as they are running. This conversion is accomplished by a program stored in a chip on the computer. The program which converts program instructions from BASIC into Machine language and Machine language into BASIC is called the BASIC Interpreter.

When you write a program in BASIC, you have produced a source program in text form. The BASIC interpreter then uses your program as a source of instructions or commands to control its execution.

BASIC Interpreter* Microsoft has developed an easy-to-use BASIC for the microcomputer user. It is simple to understand, code, and debug. The programmer can use this BASIC in many applications while creating simply structured programs. A wide variety of users and microcomputer manufacturers have utilized this BASIC. Microsoft Consumer Products.

BASIC Manuals Apple Computer Inc. has issued a number of tutorials and reference manuals. They accompany some of its computers and must be purchased separately for others. The Apple II BASIC Programming Manual and the Apple II BASIC Tutorial accompany the Apple II computer and instruct its user in the principles of Integer BASIC. The Applesoft Reference Manual and the Applesoft Tutorial accompany the Apple II+ system and instruct the user in the principles of Applesoft BASIC programming. BASIC programming manuals and tutorials must be purchased separately with the Apple IIe system. There are numerous tutorials and reference books available which teach BASIC programming. The Apple III computers are also sold with no BASIC programming manuals. These manuals are provided with the Apple III Business BASIC language.

Basic Math Skill Games* Three different levels of difficulty increase students' capabilities in solving math problems with speed and accuracy. This twelve-program package was designed for elementary through junior high school students. Mentor Software Inc.

Basic Math System H* Students between second and eighth grade may use this five-program package to increase their skill and speed in addition, subtraction, multiplication, division, fractions, decimals, and ratios. 48K. Mathware/Math City.

Basic Math Systems S* An eight-program package designed for students from second to eighth grades. Lessons are the same as in Basic Math System H, with the addition of an optional lesson selection feature which will select individual practice lessons for up to fifty students. 48K. Mathware/Math City.

BASIC Program—SAVE Instructions. Any program which resides in the Apple computer's memory may be transferred to disk for storage by entering:

```
SAVE <program name>
```

This will cause the program to be stored on the current default disk drive. If, for example, the current disk drive is drive 2 in slot 6, you can save the program on drive 1 by entering:

```
SAVE <program name>,S6,D1.
```

In CP/M, a program can be saved on the default disk drive by entering:

```
SAVE <program name>.<extension>
```

An example would be SAVE DATA.BAK.

BASIC Programming* This tutorial for learning BASIC on the Apple is suitable for high school, college, or adult school. Written by the developers of BASIC, the set includes instructional disks and program manual. COM Press.

BASIC Statements, Multiple On One Line You can put a colon (:) at the end of one statement and continue entering another statement on the same line, without giving a new line number. The line number at left refers to all statements on the line. The word REM allows a comment or remark to be added after a statement with a separating colon. Examples:

```
40 LET X = 1:REM Comment
50 LET X = 1:LET Y = 2
60 LET X = 1' Comment
```

BASIC Statements, Table of Formats and Descriptions:

Type: C = Command S = Statement (not Input/Output) S-I/O = Input/Output Statement F = Function RV = Reserved Variable

Versions: I = Integer A = Applesoft B = Apple III Business BASIC

Statement	Type	Description	Versions		
			I	A	B
ABS(<x>)	F	Absolute value of <x>	*	*	*
ASC(<x$>)	F	Gives ASCII code of 1st character of <x$ >	*	*	*
ATN(<x>)	F	Returns arctangent of <x>		*	*
AUTO<num>,<incr>	C	Automatically numbers lines	*		
BEEP	S-I/O	Speaker emits beep sound		*	*
BLOAD<filespec> [,<offset>]	C	Loads binary data (Machine language) program	*	*	
BSAVE<filespec>, <offset>,<length>	C	Saves binary data	*	*	
CALL<numvar>, <variable list>	S	Machine language program called	*	*	*
CHAIN<filename>	S	alls and passes variables to another program			*
CHR$(<n>)	F	Gives character with ASCII code <n>	*	*	*
CLEAR[,<n>,<m>]	C	Program variables cleared; optionally sets memory area		*	*
CLOSE#<filename>	S-I/O	Closes a file	*	*	*
COLOR=	C	Sets color for plotting in high-resolution graphics	*	*	
CON	C	Continue program where stopped	*		
CONT	C	Continues program execution	*	*	*
CONV	C	Returns the real value of an expression after evaluating the arguments.			*
CONV%	C	Returns Integer value after evaluating the arguments of an expression.			*
CONV&	C	Returns long Integer value after evaluating the arguments of an expression.			*
CONV$	C	Returns a string after evaluating the arguments of an expression.			*
COS(<x>)	F	Computes cosine of angle <x>,(<x> is in radians)	*	*	*
DATA <list of expressions>	S-I/O	Data table is created to be read by READ statement	*	*	*
DATE$	S	Gives the system date			*

BASIC Statements, Table of Formats and Descriptions:

Statement	Type	Description	Versions		
			I	A	B
DEF FN<name> (<arglst>)=<expr>	S	Defines numeric or function or string		*	*
DELETE<line1>-<line2>	C	Deletes specified lines in a program			*
DIM<varnam> (<subscripted variables>)	S	Sets up maximum subscript values for arrays and makes available space for them	*	*	*
DIV	E	Denotes integer division			*
DRAW <number> AT	C	Draws shape from table at X coord, Y coord		*	
DSP	C	Display minimum and/or maximum value of variable while program runs	*		
END	S	Terminates the program, closes all files, and returns you to command level	*	*	*
EOF<f>	S-I/O	End of file condition on file <f> is indicated			*
ERR	S	Gives the error code number of the last error			*
ERRLIN	RV	Print line number where error appears			*
EXFN	C	Execute external Assembly language function			*
EXFN%	C	Same as EXFN except integer is returned			*
EXP(<x>)	F	Returns the number e raised to the <x> power		*	*
FOR <variable≥<x> TO <y> [STEP <z>]	S	Used with NEXT statement to repeat program lines a specified number of times	*	*	*
FRE(<x>)	F	Gives the number of unused space in memory		*	*
GET[#]<filename>	S-I/O	Record is read from a random file		*	*
GOSUB<line>	S	Used with the RETURN statement to execute and return from a subroutine	*	*	*
GOTO<line>	S	Delivers control to a specified line	*	*	*
GR	C	Display low resolution graphics screen. Remains until TEXT is entered.	*	*	
HCOLOR =	C	Sets high resolution graphics color to specification color.		*	
HEX$(<n>)	F	Gives a string representing the hexadecimal value of n			*
HGRC	C	Display high resolution graphics screen number 1. Remains until TEXT is entered.		*	
HGR2	C	Display high resolution graphics screen number 2. Remains until TEXT is entered.		*	
HIMEM	C	Specifies highest memory address available for storing a BASIC program.	*	*	
HLIN	C	Draw horizontal line on lo-res screen from X coord (1), to X coord (2), at Y coord.	*	*	
HOME	C	Clear screen and return cursor to upper left corner of screen.		*	*
HPLOT	C	Draw horizontal line on hi-res screen between X coords(1), and X coord (2), at Y coord.		*	
HPOS	C	Print character at designated horizontal position			*

BASIC Statements, Table of Formats and Descriptions:

Statement	Type	Description	Versions		
			I	A	B
HTAB	C	Moves cursor right or left of column specified on screen.		*	
IF<expression> THEN<clause>	S	If <expression> is true, statement(s) in clause are performed.	*	*	*
IF...ELSE	E	Adds ELSE to IF...THEN and allows execution of alternate step			*
IF...GOTO	C	Allows branch to line number			*
IMAGE	C	Controls display of decimal formats			*
IN#	C	Indicates slot of peripheral device which will give input to computer.	*	*	
INPUT[“prompt”;] <variable list>	S-I/O	Reads data input from the keyboard	*	*	*
INPUT$[<n>[,[#] <flnm>]]	F	Reads <n> characters from file <flnm>	*	*	*
INSTR([n,]<x$>, <y$>)	F	Returns the position of the first occurrence of <y$ > in <x$ > starting at position <n>			*
INT(<x>)	F	Gives greatest integer that is less or equal to <x>		*	*
INVERSE	C	Causes screen output to print black on white background		*	
INVOKE	C	Loads Assembly language routine			*
LEFT$(<x$>,<n>)	F	Gives the leftmost <n> character of <x$ >	*	*	*
LEN(<x$>)	F	Returns the number of characters in <x$ >	*	*	*
[LET]<variable>=	S	Assigns the value in <expression><expression> to <variable>	*	*	*
LIST<line1> [-<line2>]	C	List specified program line(s) to screen or other device	*	*	*
LLIST<line1> [-<line2>]	C	List specified program line(s) to the printer	*	*	*
LOAD<filespec> [,$]	C	Loads a program from a specified device and optionally runs it	*	*	*
LOG(<x>)	F	Returns the logarithm to base e of <x> (natural log)	*	*	*
LOMEM	C	Specifies lowest memory location available to store programs, data, etc.	*	*	
MOD	C	Instructs computer to print remainder of division operations	*		
NEW	C	Deletes the current program in memory and clears all variables	*	*	*
NEXT[<variable>]	S	Ends a FOR...NEXT loop	*	*	*
NORMAL	C	Instuction to print normal rather than inverse characters on screen.		*	*
NOT	C	Logical operator for false	*	*	*
NOTRACE	C	Turns off trace mode	*	*	*
OFF ERR	C	Cancels most recently executed ONERR			*
OFF EOF#	C	Cancels most recently executed ON EOF			*
OFF KBD	C	Disables ON KBD command			*
ON	C	Start of GOTO and GOSUB instruction		*	
ON EOF#	C	Instructs computer to continue program execution even if End of File is encountered			*

Statement	Type	Description	Versions		
			I	A	B
ON EOF	C	See ON EOF#			*
ON ERR	C	Error trap instruction		*	*
ON ERR GOTO <line>	S	Allows error trap routine to start at specified<line>	*	*	*
ON <n>GOSUB <line>[,<line>]	S	Exits to subroutine <line> specified by <n> Used with RETURN statement	*	*	*
ON <n> GOTO <line>	S	Exits to <line> specified by <n>			*
ON KBD	C	Directs computer to execute subroutine or program with single key from key board			
OR	C	Logical or operator	*	*	*
PDL (<num>)	C	Returns current value of game control paddle	*	*	
PEEK(<n>)	F	Reads the byte from the memory position <n>	*	*	*
PERFORM	C	Executes a Machine language program previously loaded by INVOKE.			*
PLOT	C	Places dot at specified X, Y location in low-res graphics	*	*	
POKE <n>,<m>	S-I/O	Places a byte in a memory location	*	*	*
POP	C	Branch command which causes branch to one statement beyond second most recently executed GOSUB statement.	*	*	*
POS(<n>)	F	Gives the current cursor column position			*
PREFIX#	C	Assigns string constant for using partial path name to find and load a file.			*
PRINT<list of expressions>	S-I/O	Prints data on the screen	*	*	*
PRINT USING[v$;] <list of expressions>	S-I/O	Prints data using specified format	*	*	*
PR#	C	Output to specified slot.	*	*	
READ<variable> [,<variable>]	S-I/O	Reads data from a DATA statement and assigns them to variables	*	*	*
REC	C	Returns current record number of a file			*
REM <remark>	S	Inserts remarks in a program	*	*	*
RESTORE <line>	S	Allows DATA statements to be reread from a specified <line>	*	*	*
RESUME <line> /NEXT/(0)	S	Continues program execution after an error recovery procedure is executed	*	*	*
RETURN <line>	S	Returns from a subroutine	*	*	
RIGHT$(<x$>,<n>)	F	Gives the rightmost <n> characters of string <x$ >		*	*
RND<x>	F	Returns a random number between 0 and 1	*	*	*
RUN<filespec>[,R]	C	Executes a program, the (R) option is used to keep files open	*	*	*
RUN<line>	C	Executes a program at the <line> specified	*	*	*
SAVE<filename>[A]	C	Saves a BASIC program file on diskette or cassette; the (A) option saves the program in ASCII format	*	*	*
SCALE =	C	Set scale size of shape to be drawn.		*	*

Statement	Type	Description	Versions		
			I	A	B
SCRN	C	Returns number of color used at specified X,Y point on the screen.	*	*	*
SGN(<x>)	F	Returns the sign of <x>	*	*	*
SHLOAD	C	Loads a shape table from tape or disk		*	
SIN(x)	F	Returns the trigonometric sine function of <x>		*	*
SPC(<n>) PRINT	F	Prints <n> spaces in a PRINT statement		*	*
SPEED =	C	Sets rate of speed of transmission of characters		*	
SQR(<x>)	F	Gives the square root of <x>		*	*
STEP	C	Increment instruction in for next loop to be added to first number in loop.	*	*	
STOP	S	Stops program execution and returns to command level		*	*
STORE	C	Command to record integer or real array on tape		*	
STR$(<x>)	F	Converts the value of <x> to a string value		*	*
SUB$	C	Replace part of string with specified string			*
TAB(<n>) / PRINT TAB(<n>) / PRINT TAB(<n>)	F	Tabulates to position <n>	*	*	
TAN(<x>)	F	Gives the trigonometric tangent of <x>	*	*	*
TEN	C	Return base 10 equivalent of last 4 characters in a string			*
TEXT	C	Changes from graphics to non-graphics mode	*	*	*
THEN	C	Execution step of IF...THEN statement	*	*	
TIME$ = (<v$>) /(<v$>) = TIME$	S	Sets or retrieves the current time			*
TO	C	Sets limits of HPLOT statement	*	*	
TRACE	C	Instructs computer to display line number of each program step when run	*	*	*
TYP	C	Designates type of data to be read from a file			*
USR (<arg>)	F	Calls a Machine language subroutine with the argument <arg>	*	*	
VAL(<x$>)	F	Returns the numeric value of the string <x$>		*	*
VLIN	C	Draws vertical line from Y coord, to Y coord 2 at X coord in lo-res graphics	*	*	
VPOS	C	Designates vertical line on which output will occur.			*
VTAB	C	Places cursor on specified vertical line for input or output purposes.	*	*	
WAIT <port>, <n>[,<m>]	S	Suspends program exection while monitoring the status of a machine port		*	*
XDRAW <number>	C	Erases shape from shape table		*	

Basic Statistics* A six lesson course in basic statistics aimed at grades ten and above. Students are introduced to the basic underlying principles of statistical analysis through practical examples. Tutorials include: Fundamentals of Statistics; Errors, Accuracy and Approximation, Working with Approximations; Charts for Named Categories of Data; Charts for Time Series; and Observations for Values of a Variable. 48K. ABT Microcomputer Software.

BASIC Teacher, The* This tutorial utilizes thirteen lessons to teach the user Apple BASIC. Areas covered are: functions; loading and running; arithmetic operations; variable assignments; logical relationships; the keyboard; etc. Programming problems are included for the user to solve. Charles Mann & Associates.

BASIC Teaching Pack* This combination package includes The BASIC Teacher and The Floating Point Dictionary for a tutorial on Integer and Applesoft BASIC. Creative Discount Software.

BASIC Tutor Series* This is a seven disk series designed to teach the beginning programmer Applesoft BASIC. Disk titles include: Programming Commands; Text-File Commands/Sequential Files; Graphics Commands; Making Music and Audio; Utilities and Sample Studies; POKEs, PEEKs, and CALLs; and BASIC Aid—Saving You Time. 48K. Educational Courseware.

BASICs Diskette Apple's DOS 3.3 was preceded by an earlier version of the disk operating system. This version was called DOS 3.2.1 (commonly called DOS 3.2). The earlier system utilized thirteen sectors on each diskette rather than the sixteen sectors used by DOS 3.3. When the newer version of DOS was introduced, an inexpensive hardware upgrade was made available to every one who was using DOS 3.2.1. Apple Computer Inc. also made two disks containing utility programs available to purchasers of DOS 3.3. One of these disks is called "BASICs." It contains a program which primes the Apple's disk operating system to allow it to load and run programs stored under DOS 3.2.1. Once the BASICS diskette has been booted, the Apple can run any DOS 3.2 program. Another program called "BOOT 13" is available on the DOS 3.3 System Master Diskette. This program does the same thing as the program on the BASICs diskette.

Batch Chart Processing* The user may input as many as 500 sets of data and the computer will generate finished charts for all of them in one batch. Will generate more than one copy of any specified chart. 32K; printer. Matrix Software.

Batch Processing Running a program or series of programs with limited or no interaction between the user and the program.

Battery A device producing electrical energy by chemical means.

Battery Backup Batteries provide auxiliary power to the processor so volatile information is not lost during a power failure.

Baud The unit of measure of the speed of electronic data transmission.

Baud Rate The rate of speed at which data bits can be transmitted and received. This rate is dependent upon the hardware employed to send or receive signals. A number of communications interface cards, serial interface cards, and modems are available for use by the Apple computer. The interface cards can usually handle baud rate adjustments through software or through jumper wire changes. The modems and microcomputers usually dictate the baud rate used. Computer "characters" (letters, numbers, etc.) consist of 8-bits of data made up of 0 and 1 signals in binary code. Due to signifying the start and stop of a character, characters sent over data lines are made up of 10 such bits of data. The baud rates of modems and microcomputers generally range from 100 baud per second (bps) to 1200 bps. The most used baud rate is 300 bps. At a baud rate of 100 you are sending or receiving 10 characters per second. At 300, you are sending or receiving 30 characters per second.

Baud Rate Generator An oscillator, usually adjustable, providing clock signals for connection of a peripheral. Typical rates are 110, 300, and up to 9600 baud.

Baudot An older communications code, named for the man who invented it, and used for 5-level (hole) teletypewriter and telex machines. Other codes used are ASCII and EBCDIC, which are eight level codes.

Bay Area Systems Engineering BASE. Developers of the Apple Computer User's Encyclopedia and other information resources for the personal computer user.

B-Bus The second source-bus to the arithmetic logical unit in a 2- or 3-bus processor.

BCC In Assembly language programming in the Apple II, Apple II+, and Apple IIe computers, the mnemonic BCC stands for Branch Carry Clear. This mnemonic instructs the computer to branch a specified number of steps if the "carry bit" of the processor status register of the 6502 microprocessor chip has been cleared or has been set to 0. The mnemonic must also specify whether the computer should branch backward or forward the specified number of steps.

BCD Binary Coded Decimal. A 4-bit binary representation of the ten decimal digits 0 through 9. Six out of the sixteen possible codes are unused, requiring the use of a "Decimal Adjust" instruction for correct binary addition. 1 is encoded as 0001, 9 as 1001. Two BCD digits are usually packed in a byte.

BCP Byte Control Protocol. A protocol for communications between two computers or devices which use a special character to identify the start of a message which includes both a count of the number of data bytes, and the actual data bytes. Also called byte count oriented protocol.

BCS In Assembly language programming in the Apple II, Apple II+, and Apple IIe computers, the mnemonic BCS stands for Branch Carry Set. This mnemonic instructs the computer to branch a specified number of steps if the "carry bit" of the 6502 microprocessor chip's processor status register has been set to 1. The forward or backward branch direction must also be set at this line.

BDOS In CP/M the acronym BDOS is an abbreviation for the term Basic Disk Operating System. The random access memory (RAM) used to support the microprocessor, which runs CP/M on the Apple II series of computers, is organized into five general areas. The first of these general areas is the system parameter area which defines the peripherals supported by the system, the current disk drive in use, the user number, and other system parameters. The second general area of RAM is the transient program area (TPA) where any current programs to be used by the computer and the data for these programs are stored. The third general area of RAM is the console command processor (CCP) which contains the programs used for the built-in commands of the CP/M version being run on your Apple. The fourth general area set aside in RAM is that which contains BDOS or those programs which operate the system's peripherals. The final area of RAM is devoted to BIOS, a set of routines which operates the peripherals of the system.

Thus, BDOS manages the communications between system memory and the disk drives, printer, console, and other devices. For disk drive interaction, BDOS allocates file space into "blocks" on the disk and keeps track of the starting point and length of each file. This allocation of space is accomplished through the creation of a "file control block" each time a new file is transferred to disk.

Beagle Bros Tipdisk* Contains all of the program listings from Tip Books 1, 2, 3, and 4—on disk and ready to run. Learn about some of the tricks your Apple can do. Beagle Bros Micro Software.

Becoming an Informed Shopper* Provides information to help shoppers chose the best quality at the best prices. MCE, Inc.

BEEP—BASIC Statement BEEP causes the speaker to emit a sound at 800 Hz for ¼ second. The format is:

```
BEEP
```

Beef Feedlot Records and Analysis* Maintain records of feedlot expenses and weight-gain per head or herd of cattle. Up to thirteen variables can be recorded and hypothetically varied to determine optimum configuration of variables. Tucker Farm Consultants.

Beef Feeder Projection* Your beef feeders are evaluated for estimated efficiency in profit per head and per herd. Break-even selling and purchase prices are taken into consideration. H.C.I.

Beginner's Pascal* An introduction to programming in Pascal for a beginner or for a user wanting to learn a new language. The tutorial includes a short course on computers in general and the history of Pascal in particular. The course teaches the fundamentals of Pascal programming including control structures, looping, variable definitions, arrays and screen control and formatting. Little Genius Ltd.

Beginning Applesoft BASIC* An amply tested educational package for teaching BASIC in the classroom. It consists of five units that teach a selection of BASIC commands and concepts. Units are made up of sample programs and lab work. Ties Minnesota School District.

Beginning BASIC* This is a menu-driven tutorial in Applesoft BASIC with twelve lessons geared toward the beginning programmer. The essentials of the language are covered beginning with programming concepts and ending with looping, graphics, and arrays. Applied Microsystem.

Bell On Apple computers, the character "G" key on the keyboard has the word "Bell" written over the letter G. This is a carry over from the teletype days when a particular signal generated the ringing of a bell on the receiving terminal to attract attention to an incoming message or an important message. The same attention getter can be accessed from a program by typing a CTRL-G sequence into a program line. When the character for the "Bell" character to the speaker which produces a tone similar to a "Beep." This tone is generated on a frequency of 100 Hz for 1/10 of a second. There is no on-screen activity which indicates that a sound is being generated.

Bell Laboratories Research laboratories in New Jersey which originated many prime discoveries in the electronic and computer field.

Benchmark Program A specific program written to calibrate the speed of a computer in a well defined situation, or type of computation, e.g.

scientific "number crunching," sorting, or compilation.

Beneath Apple DOS* By Don Worth and Pieter Lechner. This book is the classic (publ. 1981) explanation of the esoterica, minutiae, and details about Apple DOS. With a little bit of study, it is even reasonably easy to understand. If you want more detail on DOS, VTOC, track organization, DOS program logic, customizing DOS, etc., this is the best reference for you. Quality Software.

Beneath Apple DOS—Bag of Tricks* Four Machine language utilities for the novice as well as experienced programmer. TRAX is a disk-track-reading program, which displays formatting information and indicates format problems. INIT is capable of reformatting parts of a disk while not disturbing data you wish to keep. ZAP reads, displays, and updates disk sectors. FIXCAT is an automated process to recover damaged catalog tracks. 48K. Quality Software.

Beneath Apple Manor* Beneath Apple Manor is an interactive single-player adventure game which combines text and graphics in its play. The object is to gather all of the treasure hidden within a two-dimensional maze. To accomplish this objective the game player must withstand the attacks of all sorts of monsters. The graphics are very good. The movements are controlled by keyboard directional commands (N, S, E, & W). Player actions are controlled by one letter mnemonic commands such as A for Attack, Z for Zap, K for Kick open doors, B for Bash down doors which can't be kicked open, and R for the cowardly act of Running away from an attacker. The game has sound effects which may be turned off. Games in progress can be saved and subsequently reloaded into the computer. The play of the game can be varied by adjusting the number of rooms per level and by adjusting the difficulty factor from 0 to 10. As the player progresses through the game, he gains experience points and finds treasure. When he starts the game he is a reasonably intelligent, reasonably dextrous, and reasonably strong character. As he gains experience points, he can increase all of these attributes. When the game starts, he has no armor or weapons. As he finds treasures, these treasures are valued in gold which may be traded for weapons and armor. A number of weapons such as magic wands can be found in the maze. This game is entertaining and contains quite a bit of action. Quality Software.

Benicom* This package is for the life insurance professional who sells benefits packages. A presentation package is created to describe the various unique fringe benefits for each individual. This program could help you increase your salary, savings, and sales. 64K. Insurance Micro Software, Inc.

BEQ In Apple Assembly language, BEQ is the mnemonic command for Branch if EQual to a specified number. In an Assembly language program, this command allows the user to define a condition of equality with a specific character prior to branching.

B.E.S.T.* BASIC Enhanced Software Tools is a comprehensive package for writing, and debugging BASIC programs. Some of the features include a thorough cross-reference system, REM, variable, and line optimizing, program merging, and automatic line numbering and renumbering. Sensible Software.

Beta Test Site vs. Alpha Test Site See Test Site—Alpha and Beta.

Better BASIC for the Apple* Written by J.N.P. Hume and R.C. Holt. This text, written by two professors in the Department of Computer Science at Toronto University, addresses the subject of BASIC programming explicitly for the Apple. All programs will work on the Apple IIe, although that system is not mentioned directly. The sequence of chapters is reasonably standard, with summaries and exercises at the end of each; the discussion of structured programming found here is not present in most other texts. The answers to the exercises are not included in the text; presumably they are available from the publisher on request using school letterhead. The discussion of "defensive programming," remarks, and debugging in Chapter 15 could probably be addressed earlier in the course, if read initially, by someone using the text for a self-paced study guide. Reading grade level 8.75. Reston Publishing Co.

BG Interface Breadboard* Facilitates the construction of custom interfaces that can be used for a variety of needs. A selection of texts are included for creating experiments in measurement and control of unknown voltages and currents, A/D and D/A converters, asynchronous serial communication schemes, and others. Assists with the understanding of I/O circuitry. Requires programming skills in BASIC. 16K; sold assembled or in kit form. Group Technology Ltd.

BGRAF.INV This is the acronym for a collection of graphic subroutines in Apple III Business BASIC. This subroutine must be accessed by an INVOKE command in a program. When this subroutine is INVOKEd, its name must be enclosed in quotation marks in the program line which contains it. It may also be INVOKEd in the immediate mode. In that case, the quotation marks are optional.

Bible* Test your knowledge of the New and Old Testaments. The 400 questions are in true/false, multiple-choice, or short-answer format. 48K. Academic Hallmarks.

Bible Baseball* Run the bases to score points as you test your knowledge of the Old Testament. Each game consists of 200 questions. Institute for Computers in Jewish Life.

Bible Quiz* An aid to memorizing scriptures. Bible quiz asks you five different types of questions: 1) give reference to a quoted verse 2) give topic of verse number, 3) fill blanks of quoted verse, 4) pick verse number in a chapter for a particular subject, 5) quote a numbered verse. There is a file maintenance program that can be used on an access text file, and the items in this can be changed, deleted, or added to. 32K; Professional Computer Systems.

Bibliography* This program works in concert with your word processing program (WordStar, The Bank Street Writer, etc.) to compile your text bibliography. You create a reference file of sources and citations that are automatically matched when detected. Use it to create a standard bibliography or add footnotes to your text. Reference entries may be in any format and any length. 48K. Requires CP/M 2.2. Digital Marketing.

Bi-Directional Data flow may go in either direction on a wire. At each end of the wire there are transceivers to both receive and transmit. Common bi-directional buses are tristate or open collector transistor-transistor logic.

Bi-Directional Printing Alternately printing in either direction. A line printed left to right is followed by a line printed right to left, avoiding a carriage return delay and greatly increasing output.

Billings Management* A complete billing and invoice report system. The system maintains a monthly statement and a ledger for each account. 16K. Charles Mann & Associates.

Binary Code Numbers expressed in terms of base 2 (zeroes and ones). Also (and less correctly), Machine Code.

Binary Counter An electronic device which outputs a sequence of ascending or descending binary numbers.

Binary Files The Apple computer's disk operating system allows bit by bit information to be transferred into the computer's memory from disk storage or out of the computer's memory into disk storage. Thus, pure binary and hexadecimal data can be handled by DOS. Binary files on the catalog of the disk are prefaced by the letter B. The command BSAVE is used to save binary files to disk. The command BLOAD is used to load these files.

Binary Number A representation of an integer as a sum of powers of 2, using a sequence of 0s and 1s.

Binary Search An efficient search technique for sorted tables. Works by determining which half of the table an entry is in, then which half of that half, etc.

Binary-To-Applesoft Decompiler* Convert Machine language programs into Applesoft code. You may be able to understand BASIC better than assembler. If that is true, this utility will be handy in modifying complicated Machine language programs. Simulation Software.

Binomial Multiplication* Uses Apple graphics to demonstrate that $(X+A)(X+B)=X(X)+AX+BX+AB$ is really a true equation. 48K. Math Software.

Biobits I: Life+* Construct a table from the following elements: passive growth, active growth, simple change, and differentiation. Growth may occur in the first three modes only. Learn the fundamentals of biology, mathematics, and computer science through the use of this program. 48K. COM Press.

Biobits II: Magic Flag* Learn the basics of entropy and randomness as you use your knowledge of physics, evolution, biology, and Genetics. 48K. COM Press.

Biobits III: Growth* Discover the relationship between the environment and population growth. Contains two programs on population size and allometry. 48K. COM Press.

Biobits IV: Interaction* The effect of interacting populations may be easily understood with this program. Based on Volterra Lotka equation. 48K. COM Press.

Biobits V: Profile* Designed for computing age and sex ratios. Populations may either be stable or unstable. 48K. COM Press.

Biobits VI: Evolution* A four-program package pertains to the many aspects of evolution. Also includes the concepts of natural selection as conceived by Charles Darwin. 48K. COM Press.

Biobits VII: Nucleic Acid Connection* Color graphics aid your understanding of nucleic acids, DNA, and RNA. Text is incorporated with diagrams. 48K. COM Press.

Biobits VIII: Analytics* A combination of statistics formulas and curve analysis programs. The statistics programs calculate variance and Chi Square, while the curve analyses consist of Fourier Analysis and regression analysis for linear, power, exponential, or logarithmic models. 48K. COM Press.

Biographies* This educational program is totally devoted to library cataloging of biographies. It explains how biographies are shelved and what the spine lettering means. Cassette or disk. Right On Programs.

Biology* The fundamentals of biology are covered in this fifteen-program package. Conduit.

Biology* A series of separate programs each containing 400 short answer, true/false, and multiple choice questions. Questions are of a general knowledge kind and are not directed at any particular age group. Biology #1 contains questions about the specific system anatomy of life forms; #2 contains questions about life forms low on the evolutionary scale; #3 has questions about taxonomy; #4 is concerned mostly with plants; and #5 is about genetics, evolution, and ecology. Disk. Academic Hallmarks.

Biology Energy and Life* A teaching tool for demonstrating the relationship between life forms and the energy they use. Metabolism, energy sources, chemical pathways, and aerobic and anerobic respiration are discussed. Branching paths of study and program use between units are possible. The program provides tutorials and practice drills. Concepts are beautifully illustrated with moving color graphics. Three levels of difficulty. 48K. Com Press.

Bio-Printer* Offers a plotting routine for biorhythms. This gives day by day listings which include a biorhythm graph with daily indications of amplitude and the part of the cycle that has passed. Designed to work with a line printer only. 8K. Matrix Software.

Biorhythm* Figure out your three life cycles: emotional, physical, and intellectual, and plot them to the screen or printer. Golway Computer Enterprises.

Biorhythm Compatibility Analysis* Prints out percentage compatibility for two people and plots your biorhythm cycles for the current month so you will be able to anticipate "critical" days. Mike Rowe Productions.

Biorhythms* A display grid with reverse field graphics and moving sine waves. Birth date and time-scan data is entered, and physical, mental, and emotional biorhythms are plotted for a one-month time period. Each factor has its own graphics and is plotted using curving sine waves. What results is three interweaving waves against a grid of one month. 8K. Matrix Software.

BIOS BASIC Input/Output System. BIOS is an acronym for the functional module of CP/M which allows the computer to talk to its peripherals. BIOS carries out all of the following functions: read the system's console or terminal and return an ASCII character to memory; write to the console by sending an ASCII character; read the system's reader device and return an ASCII character to memory; write to the system's punch device by sending an ASCII character to it; write to the system's list device (printer) by sending ASCII characters to it; get the input/output status of peripherals; set the input/output status of peripherals; print to the system buffer; read from the system buffer; and determine whether the console is ready to transmit or receive. Certain versions of CP/M and MP/M allow direct input to the console and direct output from the console. Consult the documentation which accompanies your version.

Bipolar A technology of integrated circuit fabrication which uses transistor switching elements based on majority carriers for switching and amplification.

Bird Classification Program* Includes 1,000 species of birds. Characteristics are given in a sample file for 150 American varieties. Birds are classified by zone, size, and color. 48K. American Avicultural Art & Science, Inc.

Birds* A teaching program for young children that tells them what a bird is, what it looks like, how it is born, and how it lives. A game is included which rewards right answers about the information taught. Disk or cassette. Right On Programs.

Birth of the Phoenix* A tutorial for the beginning game player that acquaints him with the world of computer adventures. Saving the Phoenix from extinction is interesting, fun, instructive, and paves the way for more advanced games. 48K. Phoenix Software, Inc.

B.I.S. General.Ledger.On.Line* A high-speed general ledger system that ensures fast posting and rapid access to account data for efficient decision-making. This system handles up to 170 general ledger accounts, and three profit centers per account, with many more options and functions available. Financial reporting is made easy with custom report generators. Two disk drives. Broderick & Associates.

Bistable A device that is always in one of two possible stable states.

Bistable Multivibrator Flip-flop. Active elements able to assume either one or another stable state characterize—a flip-flop circuit.

BISYNC ("by-sink") BInary SYNchronous Communications protocol. An IBM character-oriented protocol for synchronous transmission of binary-coded data between two devices, using a defined set and sequence of control characters.

Bit A contraction of Binary digIT. A bit is a 0 or a 1. Bits are used in computer systems to code information, instructions, and data. Larger units of bits are: nibbles (4), bytes (8), or words (16, 24, 32, 96 or more).

Bit Array Apple III Business BASIC DRAWIMAGE and NEWFONT commands use images which have been previously created and stored in memory as graphics patterns. These graphic patterns are built as a two dimensional array of bits, with the on bits (equal to 1) taking on the designated screen color. The graphics patterns are built through the use of arrays written in Apple III Business BASIC.

Bit-Mapped All Apple computers rely on bit-mapped graphics for screen displays. This means that every pixel position on the computer's display screen has a corresponding location in the computer's memory.

Bit-Parallel Data transmission method where every digit of a binary number is sent over a separate wire simultaneously.

B.I.T.S.* Perfect for data communications work up to 300 bps, B.I.T.S. is easy to install and use. Since data is saved as a sequential text file, it can be edited by word processors, manipulated by your program or EXEC'ed into memory to become a program. Text files from your disk can be sent to another system one line or character at a time. It is compatible with the screen and four popular eighty-column boards. Software Sorcery, Inc.

Bit-Slice A vertical slice of a computer. This component constitutes an n-bit slice of a traditional CPU, minus control. Usually n = 4. A bit-slice implements a complete data path across the CPU, including multiplexers, ALU, shifters, registers, and accumulators. A typical case would be two 4-bit, bit-slice processors linked together to make up one 8-bit processor.

Blackjack "21" Strategy (Not A Game)* Prepare for Las Vegas by learning the standard new techniques for playing "21." You will learn when to stand, when to draw cards, and when to double down. One to four decks are included. Paul's Electric Computer.

Blank Line—Print on Printer A PRINT statement with no other specifications will print a blank line (that is, feed the paper up one line and return to left margin) so you can space your printout format neatly.

Blank Spaces Many programmers use blank spaces in program lines to make their programs readable when the programs are listed to the screen or to a printer. Applesoft BASIC automatically removes any unnecessary blank spaces when you press RETURN to commit individual program lines to the computer's memory. When each line is subsequently LISTed to the screen or to a printer by using the LIST command, Applesoft supplies blank spaces within the listing in a manner provided for in ROM. The user may examine any program line as it is actually stored in memory by typing POKE 33,33 prior to typing LIST followed by the line numbers to be listed. This characteristic of Applesoft BASIC applies only to material in program lines not enclosed in quotation marks. The characteristic is illustrated below.

```
10 PRINT "THIS PROGRAM TAKES TWO
   NUMBERS WHICH YOU"
20 PRINT "INPUT AND ADDS THEM TOGETH-
   ER, SUBTR BY THE OTHER."
45 PRINT : PRINT
50 INPUT "INPUT BOTH NUMBERS SEPARATED
   BY A COMMA, (X,Y)";X , Y
55 PRINT : PRINT
60 PRINT "THE SUM OF X AND Y = "; X + Y
65 PRINT "THE DIFFERENCE OF X AND Y = ";
   X - Y
70 PRINT "THE PRODUCT OF X AND Y = " X * Y
75 PRINT "THE QUOTIENT OF X DIVIDED BY
   Y = "; X / Y
80 END
```

The program listing shown above is an example of the method a programmer might use to enter the program. There are unnecessary spaces on line 50 after the semicolon, before the comma, and after the comma which separates X and Y at the end of the line. A similar condition exists in lines 60, 65, 70, and 75. If the programmer then types LIST 55-75, the listing would appear as shown below.

```
55 PRINT : PRINT
60 PRINT "THE SUM OF X AND Y = ";X + Y
65 PRINT "THE DIFFERENCE BETWEEN
   X AND Y = ";X - Y
```

```
70 PRINT "THE PRODUCT OF X TIMES Y = "
   ;X * Y
75 PRINT "THE QUOTIENT OF X DIVIDED BY
   Y = ";X / Y
```

Applesoft inserts spaces as instructed by routines stored in ROM. These spaces are primarily at points where the text is displayed at the beginning of the line. The programmer may observe the spacing as it actually occurs in memory rather than designated by ROM by typing POKE 33,33 prior to typing LIST. This is illustrated below:

```
POKE 33,33 (RETURN)
LIST 55-75
55 PRINT : PRINT
60 PRINT "THE SUM OF X AND Y = ";X + Y
65 PRINT "THE DIFFERENCE BETWEEN X AND
   Y = ";X - Y
70 PRINT "THE PRODUCT OF X TIMES Y
   = ";X * Y
75 PRINT "THE QUOTIENT OF X DIVIDED BY
   Y = ";X / Y
```

To return to the normal type of listing as dictated by ROM, the programmer would type POKE 33,40 prior to typing LIST.

Blanking On the monitor screen: not displaying a character; leaving a space.

Blinking Cursor The Apple II and Apple II+ computers display a blinking cursor during normal programming operations in Applesoft and Integer BASIC. The Apple IIe displays the same cursor in the 40-column mode. A checkerboard cursor is displayed when the 80-column mode is activated.

BLOAD A disk operating system (DOS) command which instructs the computer to load the contents of a binary file into the computer's memory from a disk drive. If there is a BASIC program already in the computer's memory, the BASIC program will not be erased unless the binary file is loaded into the location which contains the BASIC program. Binary files may be loaded by entering BLOAD followed by the file name. They may also be loaded with a more complete instruction which uses the following format:

```
BLOAD <f>,<a>,<s>,<d>
```

<f> represents filename.
<a> represents a parameter.
<s> represents disk drive controller card slot.
<d> represents disk drive number.

Any Machine language program which is loaded into RAM from disk will not execute unless it is loaded into the same memory location from which it was saved. See A Parameter, Absolute Byte Parameter, Address Modes, and BSAVE.

Block Within a logical record, information is stored in units or blocks. Block is also sometimes used to mean a collection of logical records, as in blocked records or blocking factor. Block size is usually expressed in bytes.

Block Devices In Apple III terminology, any device which stores data in blocks of 512 characters is referred to as a block device. A disk drive is an example of such a device.

Block of Memory A series of consecutively numbered bytes in a memory device—usually internal memory.

Block-Shapes for Applesoft or Assembly* Creation and animation of many kinds of shapes, for example: block-shapes, HPLOT-shapes, vector shapes, data array shapes, and so forth. Some features are: shape drawing, music tone routines, violin sounds, noise creation, and shape examining. This package offers features that others do not: shift (ROR and ROL) animation, and two-page HPLOT of block shape animation. 48K. Avant-Garde Creations.

BMI BMI is the Apple Assembly language mnemonic for Branch on MInus. It is used in the immediate addressing mode to instruct the computer to branch forward or backward a designated number of steps when the bit in a designated memory location is negative.

BNE BNE is the Apple Assembly language mnemonic for Branch Not Equal. It instructs the computer to branch forward or backward the specified number of steps when the bits in a particular register do not equal the number designated in the Assembly language program line containing the BNE command.

BNPF Representation An older data encoding format for PROM programmers using the characters B = beginning, F = finish, N = negative(1), P = positive(0). For example: the byte 10010110 is represented as BNPPNPNNPF.

Board, Breadboard The fiberglass or pressed paper sheet used for mounting the integrated circuits. Interconnections may be wire-wrapped, soldered, or printed on the board. The term breadboard refers to a prototype circuit and dates from the time when radios were made on mother's breadboard. Also called a card when referring to smaller boards that plug into the motherboard.

Boards See: A800 Eight-Inch Floppy Disk Controller; A-D Converter; ADALAB Interface Card; A/D + D/A; ADWAR ARS 170A; AIO Serial and Parallel Apple Interface; AIO-II (Serial & Parallel Interface); AI02 Analog Input System; AI02-HS Humidity Sensing Module; AKBI Apple Prototyping Board; Alpha 2; AO-03 Analog Output System; Apio Parallel Interface Card; APMOD; Apple Language Card; Apple AP PAK; Apple Clock, The; Apple Electric Mouth; Apple IEEE-488 Interface; Apple II Display; Apple Music; Apple Parallel Interface; Apple Softcard III System; Apple Terminal; Applescope; Applethrottle; Apple-Time Clock/-Calendar Board; Appli-Card; Auto Plot; AXBI Apple Extender Board; BG Interface Breadboard; Boot Button, The; Bufferboard, The; Buff-et; CAVI 400; Cavri Interactive Video System; CAVRI V Interface Board; CCS Model 7710-01A Asynchronous Serial Interface; CCS Model 7811-01 B Arithmetic Processor; CE12 Printer Interface; Chronograph; Combination Input/Output Interface Board; Combined Graphic Writer; Computer Listener, The; Display Board; Double DOS Plus; Dual DOS; Dual-Comm Plus; EI-2 Electronic Interface; EP12 Printer Interface; EPROM Board; Full-View 80; General Purpose IO Board; Grappler, The; Hi-Plot Interface To Apple Plot; ID12 Printer Interface; Memory Plus; Mill, The; Model 7500 Wire Wrap Board; Model 7520 Extender Board; Model 7590 Etch Board; Multi-Purpose Memory Expansion Card; Music Cards MC1 & MC16; MXPLUS; Omegas Ramex 16; Omni I/O Board; Omnivision (Double Vision); Parallel Port Card (1005); Parallel Printer Board; Parallel Printer Interface; Passport Analog Synthesizer Cards; Peripheral Board Serial/Parallel I/O; Pkaso Interface, The; Pkaso EP 12-80/100 Printer Interface Card; Printermate; RAMcard; Ramplus +; Real Time Audio Spectrum Analyzer (Model AIB 232); Real Time Clock; Relocating Linking Loader; ROMPLUS+; Saybrook; Series Circuit Analyst; Series/-Parallel Circuit Analysis; Smarterm; Softcard; Softcard Premium System; SSD Solid State Disk Emulator; Station Master; STB-80, 80 Column Video Card; Super Input/Output Board; Super RAM II; Sup'R Mod II; Sup'R' Term; Synergy—Card; Tackler; Thunderclock Plus; Timemaster II; Vantec 80; Vector 4609 Interface Board; Video Term; Videodisc Controller Card; Wildcard, The; X10 Interface Board and Measurement Devices; X-10 Interface Option; Z80 Softcard; Z-Card; 79-FORTH ROM Card; 6502 Development System; 6522 Apple II Interface; 7114-01A PROM Module; 7424 Calender/Clock Module; 7440-01 A Programmable Interrupt Timer Module; 7490-01 (GPIB). See also Memory Expansion Cards.

Board-Tester A computer-controlled device that performs electronic tests on printed circuit boards.

Bonding* Designed for junior high school students, this program introduces electron and covalent bonds, valence electrons and numbers, compound formulas, and how to use a valence chart. 48K. J & S Software.

Bonds* Determines the current and projected value of bonds, interest, basic price, effective yield, and yield to maturity. United Software of America.

Book Company, The A division of Arrays, Inc., and sister-company of Continental Software; publishers of computer books on many topics and for many different computer systems. A detailed discussion of the company will be found in Softalk Magazine, August 1983, p.30-35.

Book of Apple Software 1984, The Edited by Jeffrey Stanton, Robert Wells, Sandra Rochowansky, and Michael Mellin. The definitive review book of software available for the Apple II, II+, IIe, and III computers. Each program is tested, analyzed, and rated in jargon-free, easy-to-understand terms. The Book Company.

Bookkeeper* A comprehensive business system for service and retail/wholesale businesses. Its many features include 375 general ledger accounts, accounts receivable file, accounts payable, payroll, cash receipts and disbursements, and sales tax computation. 48K and two disk drives. Matrix Software.

Books The following is a selection of useful books available on various topics relating to Apple computers and products:

TITLE	VENDOR
Advanced Applesoft BASIC	MECC†
Advanced 6502 Interfacing	Group Technology Ltd.
Apple BASIC	Prentice-Hall
Apple BASIC for Business for the Apple II	Prentice-Hall
Apple BASIC: Data File Programming	John Wiley & Sons, Inc.

TITLE	VENDOR
Apple Computer Graphics	Robert J. Brady Co.
Apple Graphics & Arcade Game Design	The Book Company
Apple Interfacing	Howard W. Sams & Co.
Apple Machine Language	Prentice-Hall
Apple Pascal	McGraw Hill Book Co.
Apple Pascal User's Guide	MECC†
Apple Pascal Games	SYBEX
Apple II Programming Exercises	John Wiley & Sons, Inc.
Apple II Quick Reference Guide	MECC†
Apple II User's Guide, The	Osborne/McGraw Hill
Applesoft Language	Howard W. Sams & Co.
Assembly Language Programming for the Apple BASIC User	Northern Technology Books
Basic Apple BASIC	Hayden Book Company
Basic BASIC—English Dictionary	dilithium Press
BASIC for the Apple II	Robert J. Brady Co.
BASIC Conversions Handbook, The	Hayden Book Company
BASIC Programs for Scientists and on the Apple II	Robert J. Brady Co.
Beginning Applesoft BASIC	MECC†
Beneath Apple DOS	Quality Software
Book of Apple Software 1984, The	The Book Company
Circuit Design Problems for the Apple	Howard W. Sams & Co.
Circuit Design Programs for the Apple II	Group Technology Ltd.
Computer for Kids/Apple II Plus Ed.	Sensational Software
Computer Graphics Primer	Howard W. Sams & Co.
Computer Tutor for the Apple II, The	Prentice-Hall
Computer Tutor, The	Little Brown & Co.
Data File Programming for the Apple Computer 807	John Wiley & Sons, Inc.
Engineering Applications of Computer Graphics	Kern Publications
Everything You Wanted to Know About... Why People Use Apple Computers	Sterling Swift Publishing Company
Games for the Apple Computer	John Wiley & Sons, Inc.
Guide to Developing Instructional Software for the Apple II Micro-computer	MECC†
Graphic Software for Microcomputers	Kern Publications
Graphics Cookbook for the Apple Computer	Scelbi Publications
Instant BASIC—2nd Edition	dilithium Press
Interface Projects for the Apple II	Prentice-Hall
Intermediate Applesoft BASIC	MECC†
Introduction to Applesoft BASIC—Student Text	MECC†

TITLE	VENDOR
Introduction to the Apple II in Instruction	MECC†
MECC Book for the Apple, The	MECC†
Microbook: Database Management for the Apple II	dilithium Press
Microcomputing Systems and Apple BASIC	Sterling Swift Publishing Company
Microcomputer Workbook	Sterling Swift Publishing Company
Mostly BASIC—Applications for Your Apple II	Howard W. Sams & Co.
Pascal Programming on the Apple	Prentice-Hall
Practical BASIC Programs—Apple II	Osborne/McGraw Hill
Programmer's Handbook for the Apple II	Computer Station
Programming the Apple	MESA Research
Programming the Apple, A Structured Approach	Robert J. Brady
Programming Tips and Techniques for the Apple II	Robert J. Brady Co.
Science & Engineering Programs—Apple Edition II	Osborne/McGraw Hill
Some Common BASIC Problems—Apple II	Osborne/McGraw Hill
Training Your Computer—Apple Edition	A. R. Davis & Co.
Using the Computer in the Classroom (Apple Version)	MECC†
Using 6502 Assembly Language—How Anyone Can Program the Apple II	Datamost Inc.
What's Where in the Apple?	Micro Ink
32 BASIC Programs for the Apple Computer	dilithium Press

† Minnesota Educational Computing Consortium

Boolean Logic Named after George Boole, who defined an algebra of logical operations such as And, Or, and Not, on the two values true and false.

Boot To use a bootstrap. Generally used to describe starting up a computer.

Boot Button, The* Place the two chips provided onto the DOS 3.3 Disk Controller card of your Apple and you have an easy way to boot your old DOS 3.2 disks—just push a button. Computer Station.

Boot DOS Before an Apple computer user can access his disk drives, he must boot the particular version of the disk operating system (DOS) which controls interaction with the disk drives. With an Apple II+ computer and an Apple IIe computer the auto start ROM chip is present in the computer. This allows the user to insert his "system master" diskette into disk drive number 1 and turn the computer on. Shortly after this has been done, the top of the screen will show the following display:

```
DOS VERSION 3.3                    08/25/80
APPLE II PLUS OR ROM CARD
                              SYSTEM MASTER
```

If you are in the system monitor (designated by the * prompt), you can boot DOS by typing C600G immediately after the prompt. This command will be executed when you press RETURN. This will then cause DOS to be booted. Other methods of booting DOS from the monitor are to press CTRL-P followed by RETURN or press CTRL-K followed by RETURN. If you are already in Integer BASIC (designated by the > prompt) or in Applesoft BASIC (designated by the] prompt), you can boot

DOS by entering IN# followed by the slot number of your controller card and then RETURN, or by typing PR# followed by the controller card slot and RETURN. See System Master Diskette.

Booting Up See Boot DOS. See Control Keys for related information.

Bootstrap A program used for starting the computer, which usually clears memory, sets up I/O devices, and loads the operating system from ROM, diskette, or cassette.

BOP Bit-Oriented Protocol. A protocol for communications between two computers or devices which causes a special bit pattern to separate groups of data bits. See BCP.

Bop-A-Bet* A game that can help early elementary students learn the proper order of the alphabet. Features a colorful maze, fast action graphics, upper and lower case letter drill, and many different game speeds. 48K. Sunnyside Soft.

B.O.S.S., The* A comprehensive job cost accounting system. This package includes general ledger, payroll, accounts receivable, accounts payable, and report-generating features for job-oriented businesses that manage up to ninety jobs per year. 48K; DOS 3.3; Applesoft in ROM; two disk drives. Sentient Software.

Bounce/'N/Bars* Have fun with this program that bounces a ball against bars and makes a sound everytime it changes direction. Children and newcomers to the computer world will enjoy this. Paul's Electric Computer.

Bouncing Short intermittent conduction from vibration of switch contacts after closure. Usually present in keyboard input and eliminated by special hardware or software (debouncing). See Key Bounce.

Bound Processor-bound or I/O-bound, indicating which component of a system is the bottleneck preventing faster performance.

Bowling Data System* A database system that records and reports league data for bowling. Features report capabilities; clear documentation; and the ability to duplicate, update, and experiment with sample data. 32K ROM. Requires printer. Rainbow Computing.

BPI Bits Per Inch. Used to specify the density of data recorded on tape or disk.

BPI Accounts Receivable* A package for the small business which consists of three disks: 1) Data Entry, 2) Reports, 3) Maintenance. The package is equipped with a device that is plugged into the game paddle I/O socket for running the programs. This device must be used or damaging results occur to the disks.

The system can accomodate about 500 accounts and 1,000 transactions per month. If more disk space is needed, instructions are displayed on the screen for additional file creation. 48K; two disk drives; and printer. Apple Computer, Inc.

BPI General Ledger* A four-disk package with a comprehensive manual for the first-time user.

Disk 1: Data Entry Disk—commands for entering data to the various journals and for printing the journals, posting the ledgers, preparing the financial statements, and closing the books.

Disk 2: Posting Disk—commands for posting all entries after sorting them by account number. The general ledger is printed, a POST command can be executed during the month, and a profit and loss statement can be generated at any time, as well as a balance sheet.

Disk 3: Maintenance Disk—used to open a new set of books and set up a new chart of accounts. This disk is used to initialize the Data Disk. A Create Accounts command opens up a list of subcommands, as follows: 1) Create General Ledger, 2) Create Payroll Ledger, 3) Create Accounts Receivable Ledger, 4) Create Accounts Payable Ledger, 5) Create Cash Disbursement Prompts, 6) Create Invoice Register Prompts, 7) Create Merchandise Purchased Journal Prompts, 8) Create Cash Journal Prompts, 9) Create Store Configuration.

Disk 4: Sample Business—allows the user to practice using the system. 48K; two disk drives; and printer. Apple Computer, Inc.

BPILOT* Gain the advantages of both BASIC and PILOT in one programming utility. Turtlegraphics included. Computer Aided & Managed Instructions.

BPL The Assembly language mnemonic for Branch on PLus. This command is used in the immediate addressing mode to instruct the computer to branch forward or backward the specified number of steps when the value in a particular memory location or register is positive.

Braces The left brace (+) symbol and right brace symbol (†) are available on the Apple III keyboard and the Apple IIe keyboard but are not available on the Apple II and Apple II+.

Brachot Boxes* An introduction to Birkot Hanehenin. The classroom is divided into two teams and member names are chosen arbitrarily to answer questions on various food items or food combinations. 48K. Institute for Computers in Jewish Life.

Brackets The left bracket symbol ([) and right bracket symbol (]) are both available on the Apple III and Apple IIe keyboards. The right bracket is not available on the Apple II or Apple II+ keyboard. The left bracket is available by using the SHIFT-M keys. The left bracket is also available on these two computers as CHR$(91). The right bracket is available in a program line as CHR$(93).

Branch A programming instruction which causes transfer of control to another program sequence. In BASIC, for example, the GOTO statement.

Branch BASIC. See GOTO.

Branch Instructions Any BASIC language, Assembly language, or Machine language instruction which tells the computer to transfer control to another program sequence or to execute the program in any sequence other than ascending order. In Applesoft BASIC, branching is accomplished by using FOR...NEXT, GOSUB followed by RETURN, GOTO, and IF...THEN statements.

Branching, Conditional The term "conditional branching" means that the computer program executes a specific step during its course only if a particular set of conditions as defined in the branching statement, occur. The branch might occur only if a particular condition of equality is true. An example of this might be:

```
IF X = 2 GOTO 2100
```

It could also depend on a condition's being false rather than true.

Branching, Unconditional If a program instruction requires a branch to another part of the program every time it is encountered rather than requiring that some condition be true or false, unconditional branching occurs. For example:

```
10 PRINT "THIS IS A TEST" : GOTO 30
20 PRINT
30 PRINT "THIS IS ANOTHER TEST."
```

Branching—BASIC Branching in Applesoft BASIC, Integer BASIC, and Apple III Business BASIC is the process of moving the operation of the program from one location (line) to another as a result of encountering a specified condition (conditional branching) or to accomplish a specified purpose (uncontrollable branch). See GOSUB and RETURN, GOTO.

Branching Backward In Machine language, specific hexadecimal codes indicate the number of program steps which must be taken forward or backward. Anyone interested in finding out what these hex codes are should consult a book about Machine language programming.

Branching Forward See Branching Backward.

Break Message A monitor message which indicates where the break in a program occurred. It displays the memory address where the program stopped, the value of the accumulator, the value of the X register, the value of the Y register, the value of the program counter, and the value of the stack pointer. For example:

```
0300 A=00B=8EX=01Y=00P=30S=F0
```

Break-CTRL To end or break current function in any program at any time, press CTRL-C together. See Control Keys for full explanation.

Breaking Away* This "Biorythms" program can predict your day for you. Creative Discount Software.

Breakpoint A point at which the processor will stop a program sequence and display the current machine status. Implemented through hardware, software, or a combination of both. See Debugging.

Brighterwriter Graphics Software* A graphics program that was created for the IP225 printer. The standard Apple parallel or serial interface card supports the hi-res dump for the printer. Computer Stations, Inc.

BRK The Assembly language mnemonic for "Break." This instruction returns control of an Assembly language or Machine language program back to the system monitor. This change of control occurs as soon as the instruction is encountered. The program counter does not reflect the address where the command is encountered. Instead, if it is checked, it reflects a memory address two positions past the point where the break occurred.

BRUN This is a disk operating system (DOS) command which instructs the computer to load and run a Machine language program. DOS loads the program into the memory location specified by the A parameter or the location from which the program was saved (see BSAVE). Each program will usually only work if it is loaded to the same memory location from which it was saved. When a Machine language program is loaded by a BLOAD or BRUN command, it overwrites any data or program material stored in the memory locations to which it is loaded. The syntax for BRUN is

```
BRUN <f>,<a>,<d>,<s>,<v>
```

<f> represents the file name to be loaded and run.

<a> represents the memory location to which the program is to be loaded.

<d>rive, <s>lot, and <v>olume parameters are optional.

BSAVE BSAVE is a disk operating system (DOS) command which instructs the computer to save the binary contents of the computer's memory starting from a specific memory address, for a specified length in bytes, as a specific file name. The syntax of this command is:

```
BSAVE <f>,<a>,<l>,<s>,<d>,<v>
```

<f> represents the name of the file for the binary data being saved.

<a> represents the address in memory at which the binary data you wish to store begins.

<l> represents the length in bytes of the data to be saved to disk.

<s>lot, <d>rive, and <v>olume parameters are optional.

Binary files are usually used to store bit-mapped pictures, material on the graphics screen, or Machine language programs.

Bubble Memory Memory utilizing microscopic magnetic domains in an aluminum garnet substrate. Present memories have 92K bits per device. Future devices should boast better than one million bit storage density per chip.

Budget Analysis* The user inputs data on the cost of operating, labor, land, and machinery ownership. Data is calculated for total economics and cash flow costs, as well as returns required to maintain net worth. This program is specifically designed for corn, oats, soybean, and wheat farmers, and produces data on a per-acre or per-bushel basis. Decision Data, Inc.

Budget Model* Used with the Multi-Year Planning Model, management can update monthly budget forecasting with actual figures, and keep short term strategy in line with long range plans. Gives ratios between actual and budgeted monthly figures using forecasted interest rates over a twelve month period. Data Systems, Inc.

Budget Planner, The* Designed to help business managers budget their companies' monthly, quarterly, and annual finance. A maximum of eight reports and summaries can be produced. Dakin5 Corporation.

Budgeteer, The* Keep track of one or more accounts and compare spendings. Dual disk drives; parallel/serial acceptable 132-column printer. High Technology, Inc.

Budgeting System* This program can define and project monthly cost categories for the farm fiscal year. Actual costs and their variance from the projected budget can be computed and more accurate figures substituted. Cash flow data is available on demand. Computerized Farm Information Systems, Inc.

BudgetKEYper* A complete household financial planner. Keeps checkbooks in balance, plans for payment of bills, and gives an expense statement. ESP Computer Resources, Inc.

Buffer In software, any memory structure provided for the temporary storage of data. In hardware, a device which restores logic drive signal levels in order to drive a bus or a large number of inputs. This allows a peripheral device such as a printer to continue to operate while the computer is used for another purpose.

Buffer, Display The Apple II, Apple II+, and Apple IIe computers have two high-resolution graphics display pages available in the 40-column graphics mode. These pages are referred to as Page 1 and Page 2. They are used to store graphics displays, and can be thought of as display buffers.

Buffer, Input The Apple II, Apple II+, and Apple IIe computers dedicate enough RAM to hold 237 to 256 characters in an input buffer. This buffer ensures that the user does not overload the ability of the computer and its microprocessor to process the information being received.

Buffer, Picture See Picture Buffer.

Bufferboard, The* This circuit board plugs onto the printer interface card you have in the Apple computer to give you a buffer of up to twenty pages of data. You can use this buffer to store the contents to be printed, thereby freeing the computer to do other tasks. Orange Micro, Inc.

Buffering The delaying and temporary storage of data in a data communications path.

Buff-et* This is a high-speed buffer for parallel printers. It will hold an average of thirty pages of data. Available in three sizes—16, 32, or 64K—it also comes with the ability to test itself and send out messages to the printer. Another handy feature is the ability to make multiple copies of a document without having to send it to the buffer multiple times. Renaissance Technology Corporation.

Bug A slang term used to describe an error or fault in a program which causes the program to cease its execution or to execute improperly. Applesoft BASIC and Integer BASIC use error messages to tell the programmer what went wrong. These error messages cover most, but not all, errors. If the program was keyed in from some printed source it should be listed on a printer and compared with the original program listing. If it was copied electronically, it should also be listed to a printer and reviewed carefully for obvious errors, improper variable references, missing returns after subroutines, etc. There are a number of commercial programs available to assist with debugging programs. See Error Messages.

Building Estimation Skills* Rounding numbers, addition, subtraction, multiplication, and division. The Learning Company.

Built-In I/O The Apple computer's input and output operations may either be controlled by hardware in the Apple's main board or by firmware cards plugged into the Apple's peripheral slots. The functions carried out by built-in I/O chips are data input, flag inputs, strobe output, toggle switches, and soft switches.

Bulk Storage Large capacity data storage, generally long term.

Bumble Games* Six programs that use number pairs to name positions in an array and points on a grid. This is a skill useful in designing computer graphics, locating places on a map, and building charts and graphs. Children will be particularly attracted to Bumby, an imaginary animal who guides the user. The Learning Company.

Bumble Plot* A package of five programs for students ages eight through thirteen to increase their skills in plotting and developing graphs. These are games that make learning basic math skills enjoyable. They are of graduated difficulty, so new skills can build on established ones, and they feature sound effects, music, and color graphics. The Learning Company.

Burn-In A phase of component testing where basic flaws or early failures are screened out by running the circuit for a specified length of time generally at elevated temperatures in some sort of oven. Also, when referring to PROMs, burn-in means to load with data.

Bursar* Records the financial status for each school club. This accounting system keeps day-to-day transactions on file. Accounts may be opened, closed, or updated. Addison-Wesley Publishing Company.

Bus Path for signals having a common function. Every standard MPU creates three buses: the data bus, the address bus, and the control bus.

Bus Controller The unit in charge of generating bus commands and control signals.

Bus Extender A device which allows additional cards to be plugged into a computer's bus. Also known as an expansion chassis.

Bus Rider* This logic analyzer for the Apple II computer comes on a single circuit board. Real-time tracking of program flow, 32 bit by 1024 sample memory, pre-trigger viewing, and more. RC Electronics, Inc.

Bus Termination An electrical means of preventing reflections at the end of a bus that is only necessary in high-speed systems and some specially designed low-speed systems.

Busicomp* A system to meet small business accounting requirements. This package includes eleven integrated segments that cover payroll, inventory, receivables, payables, general ledger, and fixed assets. This is an easy-to-use system that covers the basics and enables the user to generate reports on accounts status, personnel information, expenses and revenue, and more. 48K. Advanced Operating Systems.

Business—Volume 1* A package of programs that cover various business applications. They give an understanding and offer practice in the following areas: bank interest, loans, management, money, payroll, and typing. Minnesota Educational Computing Consortium.

Business—Volume 3* A MICAS accounting System that offers general ledger, accounts payable, accounts receivable, and inventory control. Printer. Minnesota Educ. Computing Consortium.

Business Accounting Package* This flexible accounting system was designed with the new computer user in mind, as well as the person with only basic knowledge of accounting. The system is fully integrated—one entry updates all other areas affected, and includes order processing, fixed assets, general ledger, disbursements, receivables and payables. 48K or Corvus Version available. George Otis Companies.

Business Applications Software See Accounting Software; AccuRec Time Recorder/Wage Summary Program; Agency Data Management System, The; Agenda Files; ANAI; Analyzer, The; Apartment Manager; Apartment Management Program; Apartment Manager Program; APM; Apple Alarm; Apple II Business Graphics; Apple II Senior Analyst; Apple III Information Analyst, The; Apple Project Manager (APM); Apple Sack 10—Business Sack;

Applelog; Appointment Calendar, The; Appointments; APR Loan Analysis; Asset Manager; Asset Record Program; Asset-Manager; Auto Rental Management System (A.R.M.S.); Automated Building Directory System with Direct Telephone Dialing; Automated Chart Service; Banker's Construction Loan Reporter; Batch Chart Processing; Benicom; Billings Management; B.I.S. General Ledger; On Line; Bookkeeper; B.O.S.S., The; BPI Accounts Receivable; BPI General Ledger; Budget Analysis; Budget Model; Budget Planner, The; Budgeteer, The; Budgeting System; Busicomp; Business Accounting Package; Business Bookkeeper; Business Bookkeeper System, The; Business Budgeting; Business Income Forecaster; Business Income Statement; Business Package I; Business Package III; Business Planner; Business Plus; Business—Volume 3; Business Reports; Business Software Series; Business Tools; Business—Volume 1; Business Valuation Analysis; Cash Register Inventory Control; Cashmaster; Chequemate; Client Billing system; Client Management System 2.0; Client Records/-Bill Preparation; Commercial Account Profitability Analysis; Comparative Policy Analysis; Compu-Law; Compuvision; Corporation Feasibility Study; CPAPartner; Custom Meat Processing; Data Plus; Data Reporter, The; Datebook II; dBASE II; Disk Logbook; Distribution Business System, The; Easy-Filer; EasyMailer; Easy Mover; Economics of Corn Production; Effective—Series of Programs For The Manager; Effective Secretarial Practices; Electronic Price-Sheet; Employee Profiles (Evaluation), Energy Monitor—Energy Use Monitoring System; Estate Liquidity Analysis; Estimator; Executive Briefing System; Executive Secretary, The; Fast Facts; Field Companion, The; Financial; Financial Analysis Package (FAP); Financial Analyzer; Financial Facts; Financial Management System II; Financial Management System III; Financial Needs Analysis; Financial Package; Financial Partner; Financial Utilities; Formulex; FPL; General Accounting System; General Ledger; General Ledger Accounting System; General Ledger System; GL—Plus; Goals Analysis; Gusher; How to Use VisiCalc; In Soft Accountant, The; Incomplete Records Accounting System; Infotory; Innovative Program Associates; Insurance Broking System; Interest and Loans, Investments and Record of Investments; Interest Print; Introstat 2.2; Inventory; Inventory Control; Inventory Management System for Stock Control; Inventory Manager, The; Inventory Pac; Inventory Program; Inventory Software Packages; Investment and Mortgage Management; Investment Data System; Invoice Data System; Invoicing System; IRA Assessor, The; Job Control System; Job Cost Accounting; Job Costing System; Job Estimating Cost; Job/Cost Accounting; Kiss Financial Programs; Krogh; Landlord, The; Legal Accounting; Legal Clerk; Listings; Mag Files for the Disk II; Magazine Files; Magic Words; Mail List Manager; Mail List Manager Interface; MAPS/WP 6502; Market Advisor; Maxiledger; Micro Memo; Microbomp; Micro DSS/F; MicroLaw; Micropay; MICROPERS; Microrec; Microtutor; Mini Series; Money Decisions; Moneybee I and IX; Moonlighter Tax Guide; Mortgage Acceleration Program (MAP); Multi-Year Planning Model; N2 Market Analyzer; Name & Address; NDSL Internal Billing System (NIBS); Office Manager; Omnibus Banking & Financial Pak; One-Type Account System 1; Order Entry; Order Scheduler, The; Order Tracking System; Orionrater; Pascal Graphics Editor, The; Paymaster; Payroll; Payroll for the Apple II Plus; Payroll Module; Payroll Package; Payroll Software Packages; Payroll System; Payroll/Cost Distribution System; Payroll/Personnel; Paysystem Accountant; PDP—Program Director's Planner Package; Percent Concentration; Percent Problems; Performance Manager; Personal Calender; Personal Datebook; Personnel Office; Personnel Record Program; pfs: File; pfs: Graph; pfs: Report; Plan80; PlannerCalc; Planning Cash Flow; Presentation Aid; PRICE QUOTER; Professional Client Billing Series III; Professional Office Management System; Professional Secretary Package; Professional Time and Billing; Project Documentation; Property Management; Purchase Ledger System; Q-Card; Real Estate Analysis; Real Estate Analysis Package; Real Estate Analyst; Real Estate Analyzer; Real Estate Models for the Eighties; Real Estate Office Management; Real Estate Series; RECALL (The Arbitron Analysis Package); Receiver; Retail Management System; Retail Manager; Retired Lives Reserve; Sales Invoicing; Sales Ledger System; Sales Order Entry III; SBCS Accounts Payable; Screen Director; Section 79; Service Charge Analysis and Pricing Model; Sheep Production Economics; Should You Incorporate ?; Sir Isaac's Yield Calculator; Small Business Software; Smart; Smart Analyst and Graphics Package, The; Software Pac #1; Software Pac #4; Software Pac #7; Speed Stat; Split Dollar; Stock Control System; Stockfile; Stockroom; Stockseller; Store Manager, The; SuperCalc; Super-Expander Plus; Superfox; SUPR'Ledger; Systems II EX-Payroll; Target Planner; TPS Canadian Payroll System; Trader; Turnkey Enterprizes Analysis System; Typing; Typing Teacher; Typing Tutor; Understanding Sales Buying; Underwriter, The; Unidep; VC Expand; VC-Extender(tm); VersaForm; Vertex Business Software; Visicalc Templates Real Estate Analyst; VisiCalc; VisiCalc 3.3;

VisiDex; VisiFile; Visischedule. See also Database Management Software; General Ledger Software; Inventory Software Packages; Payroll Software Packages.

Business Bookkeeper* A VisiCalc Template. This is a six-template mini-system for small businesses. It deals with cash receipts, cash disbursements and banking reconciliations. With VisiCalc*'s powerful DIF commands, Business Bookkeeper is easy to use. Exec Systems.

Business Bookkeeping System, The* An easy-to-use cash basis accounting system for small businesses. It features: General Ledger, Activity Ledgers, Customer Activity, Vendor Activity, Employee Activity. 48K; two disk drives; printer. Dakin5 Corporation.

Business Budgeting* Plan and organize a practical budget for your company. Eight models cover expenses of supplies, operation, and advertising. Exec Systems.

Business Income Forecaster* A calculated prediction for one year's income and cash flow. Computes credit balances and ratios. Exec Systems.

Business Income Statement* Five blueprints aid companies to analyze financial trends and key ratios. Exec Systems.

Business Package I* A four-program package for complete financial planning. Calculate loan interests, depreciation on possessions, loan repayment schedule and amount, bank charges, and more! Micro Learningware.

Business Package III* A three-program general ledger. Keep all your accounts in balance, print journal entries, and print a trial balance sheet. Requires a printer. Micro Learningware.

Business Planner* Group employees, equipment, and costs into a project that produces income. Some features are: moving time window, tutorial documentation, financial statements, projected data by a password, and customized reports for your business. Models can be combined into larger ones. "What if?" can be developed to plan for the unexpected future. Duosoft Corporation.

Business Planner (Business Plan Modelling System)* Project the productivity and means of operation for small to medium businesses. Through modeling, elements of a project can be ploted graphically over time or during step by step segments. Customized reports can be printed to review data and base future decisions. 48K. Duosoft Corporation.

Business Plus* Intended for businesses with less than ten million dollars annual income. An interactive series of programs featuring data accessing and analyzing, full-color bar graphs, and numerous accounts receivable, accounts payable, and general ledger functions. 48K; two disk drives; 80-column printer. Howard W. Sams & Company.

Business Reports* Aids in decision making, Includes several models for analysis, comparison, and calculations. Exec Systems.

Business Software Series* A complete business package made up of five stand-alone modules that can be purchased separately or together. Modules include:

Microaccountant: A general ledger, revenue and expenses package that keeps records and generates reports.

Universal Business Machine: A package to help simplify business analysis, estimating, and planning. Includes functions for cash flow analysis, proforma financial statements, sales forecasting, and job costing.

Invoice: An interactive program to create and record invoices. You may also choose to generate shipping memos, mailing labels, audit copies and master updates to receivables files. Requires 48K.

Business Check Register: An expanded checkbook program to handle up to 500 checks per month and maintain complete records. 48K required.

Business Budget: A budgeting program that works with the Business Check Register, and obtains actual cost data by accessing the checkbook files. 48K.

The Business Software Series is available from Spectrum Software.

Business Tools* Two programs are included: Micro-General Ledger and Micro Inventory. Both are self-explanatory to help the small business keep track of important records. Serendipity Systems, Inc.

Business Valuation Analysis* Use book value, capitalization of earnings, straight capitalization methods to allow for valuation of a business. Helps in valuing the family business. Will project fifteen years into the future. RE/International Systems Corporation.

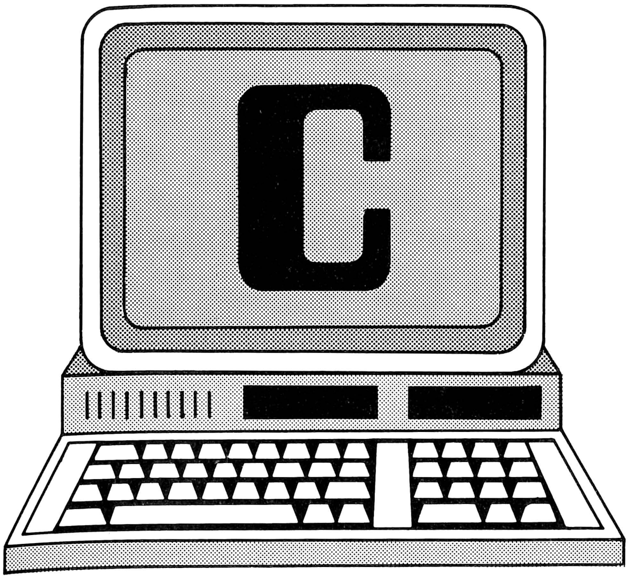
BUTTON An Apple III Business BASIC statement which requires the computer to accept input from Port A or Port B on the back of the computer. The computer is looking for the state of the button of a paddle controller or joystick. If the button is pressed, it returns a value of 255. If it is not pressed, a value of 0 is returned.

Buying Wisely* Presents and emphasizes the concepts of comparative buying. MCE, Inc.

BVC The Assembly language memonic for Branch on oVerflow Clear. This means that the program should branch to the indicated step when the overflow bit in the Processor Status Register is clear (equal to 0).

BVS The Assembly language mnemonic for Branch oVerflow Set. This means that the computer should branch to the specified step when the overflow bit in the Processor Status Register is set (equal to 1).

Byte A group of eight bits. A byte is universally used to represent a character. Microcomputer instructions generally require one, two or three bytes. One byte has two nibbles (four bits).



C Codes. ASCII = 67, HEX = 43. c—ASCII = 99, HEX = 63.

C Symbol for the carry bit; the clock; and the hexadecimal notation for the decimal number 12: C base 16 = 12 base 10 = 14 base 8 = 1100 base 2.

C Setting printer page length. To set page length (for example) to 55 lines/page, enter BASIC statement:

```
PRINT
CHR$(27);"C";"55"
```

C—Parameter The Apple computer's disk operating system (DOS) has provisions for debugging commands, input, and output passed to and from the disk drives. These debugging provisions can be turned on by including the DOS command MON (monitor) as part of the program being run. The syntax of this command is:

```
MON C,I,O.
```

C stands for commands passed to DOS.

I stands for input from the disk.

O stands for output to the disk.

MON instructs the computer to print the relevant information on the screen. Thus the "C" parameter is the "command" parameter of this DOS command. The monitoring of DOS can be turned off by typing:

```
NOMON C,I,O
```

Both commands must be included in the program being run. They are not "direct" commands. See MON and NOMON.

C Programming Language C is a high-level programming language developed at Bell Laboratories, associated with the UNIX operating system.

Cables and Adapters A variety of cables and connectors are used with Apple computers to serve specific purposes. The power cord for all of these computers is a standard, three-prong male plug on one end and a triangular three-hole female socket on the end that is connected to the computer. Disk drives are connected to controller cards on the Apple II, Apple II+, and Apple IIe by shielded parallel wire cable with a sixteen pin socket on either end. Parallel devices are connected by eighteen wire connectors and eighteen parallel, unshielded wires. Serial devices, including modems are connected to the computer via a serial interface card and a single wire connection. The Apple III makes a connection to a serial device through an RS-232 socket on the back of the computer. Disk drives for the Apple III are connected directly to a socket on the back of the computer.

Cables, Hooking up Cassette. The Apple II and Apple II+ computers are set up to allow the user to hook up a cassette tape recorder for program and data storage. Cassette input and output connectors are located on the back of the computer case, in the lower right corner as you face the computer. The computer's output line should be connected to the tape recorder's microphone input socket. The cassette player's earphone output plug should be connected to the computer's cassette input socket. See Tape—Hooking Up Cassette.

Cache A high-speed buffer used between the central processor and main memory. It is filled at medium speed from main memory with instructions and programs which can operate at high-speed if found in the cache. A new instruction sequence is loaded from main memory, if it is not already in the cache.

Cactus Plot* A hi-res graphic utility. Calculations and plotting are displayed on pre-defined graphs and tables. Options include overlay, increase/decrease of chart size, save, and recall. Southwest Edpsych Services, Inc.

CAD Computer Aided Design. Any design process, such as drafting blueprints, making architectural drawings, or making room layouts, using a computer program which outputs to a screen during the design phase and outputs to a blueprint-size printer during the output stage. The user may work with programs which store shapes, and are called from memory and placed at the desired screen locations. The person may also work with a graphics tablet or similar device which helps him draw the design or plan he requires.

CAI Computer Assisted Instruction. The use of computers to teach such skills as math, languages, shape recognition, and reading. There are a number of available educational authoring systems which allow educators to design drills and tests. There are also dedicated languages such as LOGO, which teaches programming, and PILOT, which can be used to design and implement lessons on various subjects.

CAI-Manager* Aides teachers in writing and administering exams. These tests may be issued to a group or to individual students. The academic status for each student is kept up-to-date. Includes an instruction manual. 48K. Mathware/Math City.

CalcStar* A spreadsheet program resembling VisiCalc* and SuperCalc*. Compatible with other MicroPro products, it has a similar appearance and a standard cursor control and editing control keys. Entries are recognized by the first character typed. The type can be changed and the entry line can be used as "an immediate mode calculator." A help menu is always shown, but can be surpressed to obtain more space. Output is to disk, screen, or printer. Apple IIe and Z-80 card; two disk drives; printer; and 16K card. MicroPro International Corp.

Calculus I Disk* Includes Differentiation Algebraic Functions, Maxima/Minima Problems, Relative Rates Problems, Integrations, and more. 24K. Microphys Programs.

Calendar Skills* A series of ten lessons that teach students about days, months, seasons, and holidays. Student Planning records errors to teachers' files for later review. 48K. Hartley Courseware, Inc.

Calf Production Records* Record birth weight and date, sire and dam identification, weaning date, and dam's age. Uses standard industry formulas to determine calf and herd performance statistics. It calculates figures for 205-day adjusted weaning weights and average daily weight gain, as well as adjusted nursing ratios. Agricultural Management & Economic Consulting.

California Drivers Test (2 Parts)* Presented in two parts, this is an aid to help you pass your driving test based on the California Motor Vehicle Code test. Questions are multiple-choice. Paul's Electric Computer.

Call Program execution is temporarily transferred to a Machine language subroutine or subprogram. When completed, execution resumes at the instruction following the call.

CALL An Applesoft BASIC command which causes the computer to execute a Machine language subroutine at the memory address specified by the decimal figure which follows the command. For example:

```
CALL-1052
```

will beep the Apple speaker for 1/10 of a second. In this case, the CALL was used to execute a Machine language subroutine stored in ROM. In other cases, the user would branch to an address which contains his own Machine language subroutine.

CALL a BASIC Subroutine A BASIC subroutine may be accessed by including a program number line with a GOSUB statement. This number refers to the program line which begins the subroutine. A subroutine must end with a RETURN statement to direct the program flow back to where the GOSUB caused a branch.

CALL-151 The Applesoft BASIC and Integer BASIC CALL which places the user in the monitor and allows him to program in Machine language. When this CALL is entered and RETURN is pressed, the monitor prompt appears on the left hand side of the screen. This prompt is an asterisk (*).

CALL-868 An access to a Machine language subroutine that may be accomplished from within a program step, or may be used in the immediate mode while editing programs. To use the command directly, place the cursor on the line to be deleted and enter "CALL-868". The line on which the cursor rests will be deleted. The example below illustrates how to use this command in a program step. The program listed below first clears the screen. Then it causes the sentence "THIS IS A TEST OF CALL-868" to be printed ten times on the computer screen. Three spaces are left inside the quotation marks at the beginning of the sentence to provide you with an uncluttered demonstration. Line 30 causes the second, fourth, sixth, and eighth lines to be erased from the display.

```
10 Home
15 A$ = "
20 FOR I = 1 TO 10
25 PRINT A$
30 VTAB (2): CALL-868: VTAB (4): CALL-868:
VTAB (6): CALL-868: VTAB (8): CALL-868.
```

CALLS The CALLS listed below are useful to programmers of the Apple II, Apple II+, and Apple IIe computers.

CALL LOCATION	FUNCTION
CALL-151	Enter Monitor.
CALL-182	Save register contents in reserved zero page location.
CALL-193	Restore register contents.
CALL-198	Beep computer's speaker.
CALL-211	Display ERR message on screen and beep speaker.
CALL-336	Return to BASIC. Erase program and variables.
CALL-380	Set normal video mode.
CALL-384	Set inverse video mode.
CALL-550	Output accumulator value as hexadecimal (2 digits).
CALL-856	Execute delay loop.
CALL-868	Clears text to right end of line from cursor position.
CALL-912	Scroll text window up one line.
CALL-922	Move cursor down one line—maintain horizontal position.
CALL-926	Send return and line feed to screen.
CALL-936	Clear screen and home cursor.
CALL-954	Clear text window to lower right corner from x, y coordinates in registers.
CALL-958	Move cursor up one line.
CALL-1008	Send back space to screen and move cursor.
CALL-1052	Beep speaker for 1/10 second.
CALL-1003	Send bell character to current ouput device.
CALL-1724	Print current contents of X register.
CALL-1727	Print current contents of A register and X register.
CALL-1728	Print current contents of Y register and X register.

Calorie Counter* A program that helps the calorie-conscious person keep a close eye on what he eats. Video World.

CAM Content Addressable Memory. Associative memory, addressed by contents rather than location.

CAMAC Computer Automated Management And Control. An application where a computer measures a process and automatically controls one or more devices affecting the process according to the measurements taken. Also called process control.

Cancel Current Line To edit program lines in Applesoft BASIC, press the ESCape key along with four letter keys to position the cursor to the line to be edited. The use of the ESCape key along with the letters allows the cursor to be moved without erasing or loading memory. ESCape-A moves the cursor right. ESCape-B moves the cursor left. ESCape-C moves the cursor down. ESCape-D moves the cursor up. If your Apple computer has the auto start ROM installed, there is a more convenient set of ESCape key combinations available to you. With this combination, ESC-I moves the cursor up, ESC-J moves the cursor left, ESC-M moves the cursor down, and ESC-K moves the cursor right. The REPEAT key works with any of these editing key combinations to get continuous movement from one location to another. Once the cursor is in the correct position—to the right of the line to be cancelled—the left arrow key is used to step the cursor backward, thereby erasing the contents of the line.

A simpler method is to type the line number to be cancelled. Add no text or instructions after the number and press RETURN.

Another method is to use the DEL command in Applesoft BASIC and Integer BASIC. To use this direct command, type:

DEL <line number>

If more than one line must be deleted, the starting line must be separated from the ending line by a dash. See DEL.

Another method is available in Integer BASIC. This method utilizes the back slash. Position the cursor to the end of the line to be cancelled and press CTRL-X. This places the backslash (\)at the end of the line and the line is ignored.

Cancel the Current Operation When CTRL-C is pressed, the current operation is canceled.

Capital Investment Analysis* Helps analyze return on investment, internal rate of return, or net present value. MPA enterprises.

Capital Needs Analysis* Makes a short financial analysis of a couple's financial position in the event of one's death. Shows how much additional capital is needed for the survivor and dependents. 48K. Insurance Micro Software, Inc.

Carbon Compounds* Designed for junior high school students, this program teaches bonding and double bonds, hydrocarbons and substituted hydrocarbons, structural formulas, and isomers. 48K. J & S Software.

Card Apple computers are constructed with a number of slots at the rear of the main circuit board inside the computer. These slots each have Input/-Output capability and are addressable from the 6502 microprocessor chip. The slots—called expansion slots—were installed to allow circuit boards of many different types to supplement the basic capabilities of the Apple computer. Such circuit boards are often called "cards" and are generically identified by the function they perform. Memory expansion boards or cards add more RAM memory space to the computer. The language card accomplishes the same thing as a memory expansion card. Peripheral interface or controller cards allow the computer to communicate with printers, plotters, teletypes, music synthesizers, disk drives, and other computers via telephone lines and modems. If the signals from such controller cards are passed in parallel over a number of wires the interface is called a parallel interface. If only a single wire is used, the interface is called a serial interface. Video expansion boards may be used to expand the Apple's screen display up to 132 columns in width. Analog to digital converter cards translate analog (real world or measurable) input to digital (computer understandable) data and vice versa. CP/M or Z-80 microprocessor cards take over the Apple when they are accessed and allow the computer to use the CP/M operating system. Certain graphics cards give the Apple special flexibility in controlling the use of printers. Other graphics cards provide more control of screen display. Thus, expansion cards offer a whole new world of applications to the Apple computer user.

Card Cage A rack to support the printed-circuit boards in a computer.

Caroling Caroling Series* Join hands around your computer this Christmas season to sing your favorite carols. All that Christmas spirit and color graphics, too! 32K. Homeware.

Carriage Return A carry-over term from teletype and typewriter days. In computer terms, the cursor is advanced one line and returned to the left margin. In a program, this is accomplished with a PRINT command on a line by itself or set off from other instructions by a colon. Another method of inserting a carriage return in a program is to insert the ASCII code which causes the command to execute into the program. CHR$ (13) will cause a carriage return to be executed. The RETURN key on the Apple keyboard acts as a carriage return while a program is being entered into the computer's memory. This key causes the contents of the line which was just typed to be entered to memory. It then causes the cursor to advance one line and move to the left margin.

Carrier A base frequency used to "carry" information, is modulated to denote 0 or 1.

Carry In the status register of the central processor, a carry is a flag bit which indicates an operation overflow by the arithmetic logic unit. The carry is also used during branching and shifts.

Carry Flag The P or Process Status Register in the Apple's memory makes it possible for the computer to branch to new program steps or subroutines based on logical values. This register contains 8 bits, but only 7 are used to compare data and make decisions regarding branching. Flags in this register are said to be set if the bit that represents them consists of a 1. The flag is said to be clear if the bit is set to 0. These bits are numbered from 7 to 0 in descending order from left to right. The carry flag is the 0 or rightmost bit of the register. This flag is set (1) when addition, SHIFT, and rotate operations are being used. It is clear (0) when subtraction or comparisons are taking place. See Process Status Register.

Carrying Cases These products are designed to make your Apple somewhat portable. All have space for an Apple and at least one disk drive. Many of the cases come in various sizes to allow you to transport your entire system, including the monitor. For more details on case sizes and capacity, contact the listed vendors.

PRODUCT	VENDOR
Apple Computer Case	Knickerbocker Case Co.
Apple Sack	Tele-Terminals, Inc.
Computer Case	Fiberbilt Ikelheimer-Ernst, Inc.
Computer Cases	Computer Case Company
Flight Form Computer Cases	Cases, Inc.
Flight Form Foam-Lined Cases	Cases, Inc.

PRODUCT	VENDOR
Foam-Lined Cases	Cases, Inc.
Microcase	Casemaker
Total-System Case	Knickerbocker Case Co.

Cash Crop Projection* This program calculates total cost and profit per unit (pound, bushel, ton, or acre). It gives break-even yield and selling price as well as future crop value. Break-even cash rent and purchase price for land may also be calculated. Agricultural Management & Economic Consulting.

Cash Register Inventory Control* A program for the small businessman to handle as many as ten thousand inventory items and charge accounts. CRIC Software Systems.

Cash Versus Credit Buying* A range of options are explained to the user before purchasing an item. The characteristics of cash vs. credit for a number of items are shown and your specific situations can be inputted for analysis. MCE, Inc.

Cash-Flow Analysis* Document financial ability, predict cash problems, determine how purchases will affect cash flow, and how your finances will look after expected purchases and income. Alpha-Omega Systems, Inc.

Cashmaster* You can record sales information, end-of-day reports, and customer receipts on this computer-based point of sale cash register. The program can be used with most available accounting and inventory packages. The programs can be sold together or as a system to be used by distributors, wholesalers, and for client billing. Versa Computing, Inc.

Cassette A small plastic cartridge containing two spools of ⅛ inch magnetic tape. Frequently used in audio recorders. Applied to the mass storage requirements of microcomputers and minicomputers, a "digital" cassette meets standards for digital recording.

Cassette—Type of Files Cassette tape players offer an inexpensive but slow alternative for program and data storage outside of the computer's memory. Disk drives are more flexible and more efficient. Tapes may be used to store and load a language such as Applesoft or Integer BASIC if this language is not resident in your computer. They may also be used to store shape tables, programs, and text-type data files. Finally, tapes may be used to store binary data from the computer's random access memory.

Cassette—WRITE Instructions The WRITE command is used to save binary data or programs from the Apple II, Apple II+, and Apple IIe RAM to tape. To save this type of data or program to tape, the beginning and end of the range of memory occupied by the binary program or binary data should be entered separated by a period. The tape recorder should be started by pressing the RECORD and PLAY buttons simultaneously. Then you should enter the starting memory address in decimal or hexidecimal, a period, the ending address, the letter W, followed by pressing the RETURN button. The computer will beep again when it has finished writing to tape. You should record the counter number when recording starts and ends and associate these numbers with the material being recorded. This index to the tape should be kept with the cassette and the cassette should be labeled.

Cassette, Read From It is possible to store binary data from specific locations in RAM with the WRITE command. The READ command is used to load such data back into the computer's memory. It is not necessary to read this data into the same locations as those from which the data was stored. To load data to the computer, start the cassette recorder by pressing the PLAY button. Type the starting and ending memory locations in decimal or hexadecimal notation. Then type the letter "R" followed by pressing the RETURN key. The computer will beep when reading starts and again when it is completed.

Cassette Arrays Arrays can be STOREd to cassette by the Apple computer by using the STORE command. When this command is used to store arrays, the name given to the array has no significance when loading the array back into the computer's memory. The dimensioning of the array is extremely important. If the array is not dimensioned to the same size on loading as it was on storing, the computer will notify the user with an "?OUT OF MEMORY ERROR" message or an "ERR" message. Arrays are loaded from a cassette with the RECALL command. An example of a legal cassette store and recall sequence is presented below:

```
DIM L (3,3,3)
STORE L
DIM R (3,3,6)
RECALL R
```

Regardless of the name it is given, this array will be successfully loaded from tape, as long as 1) the only dimension in the recalled array that is larger than the corresponding dimension in the stored array is the last dimension, and 2) the number or elements in the recalled array must be equal to the number of elements in the stored array. The STORE and RECALL commands may only be used with arrays.

Cassette Control Device* This little device allows your Apple to activate a cassette recorder. When used with a remote control tape recorder, audio commands, directions, or other recorded material can be sychronized with the computer. This can be particularly useful in an educational setting. Hartley Courseware, Inc.

Cassette Interface* This add-on device allows the starting and stopping of a cassette recorder under program control. Easily installed by plugging it into the game socket. No complex programming required for operation. Requires that the cassette recorder have a subminiature 1/16 inch remote control jack. Southwest Edpsysch Services, Inc.

Cassette LOAD Instructions Programs and data may be loaded from a cassette recorder by first rewinding the tape. Then, press the PLAY button on the recorder and enter LOAD. As soon as loading begins, the computer will beep. If you are using a cassette as a data or program storage device, it is a good idea to record the starting point and ending point on the cassette recorder's counter along with the name of the program stored there. Then, if you have saved several programs on tape, you can find the program you wish without loading all of the programs until the desired one is found.

Cassette Save Instructions To save a program or a text file to cassette, first rewind the tape to where you wish to begin storage. This should be a point where the counter on the recorder indicates that you have no material which will be overwritten. To prevent such overwriting, you should keep a list of all programs saved to tape along with the counter numbers for their starting and ending points. When you are ready, press the cassette recorder's RECORD button and PLAY button at the same time. Type SAVE, then press the RETURN key. The computer will then write a ten second tone to the tape recorder. This tone, called a "leader," allows the computer to load from tape by providing the computer with a recognition and timing signal. The computer will beep when saving starts and again when saving has been completed.

Cassette Tape—Hooking Up Cables. See Cables, Hooking Up Cassette.

CAT In Apple III Business BASIC, the reserved word "CATALOG" may be abbreviated as CAT and used to access a disk catalog.

CATALOG An Apple Disk Operating System 3.3 command which instructs the computer to read the catalog of the diskette on the current disk drive and to print this information on the screen. Each diskette contains such a catalog which lists the name and characteristics of each file stored on disk. If you enter CATALOG for a typical general purpose diskette from your collection, you will probably get a catalog listing similar to that shown below:

```
CATALOG
     A 002 HELLO
     I 012 HANGMAN
     A 004 SEARCH ROUTINE
     I 006 CONVERSION
     B 022 ALPHA SUB
     B 034 BIRDS.PIC
     T 011 NAMES
```

The letters to the left of each file name represent the language in which the stored program was written or the nature of the data stored in the file.

A stands for a program written in Applesoft BASIC.

B standas for a Machine language program or a binary data file.

I stands for a program written in Integer BASIC.

T stands for a text data file.

The numbers to the left of the file name represent the length of the file in sectors.

When the catalog is displayed on screen, it lists only 18 lines. If the catalog on your diskette is more than 18 lines in length, press any key except RESET, CTRL, or SHIFT to scroll it upward to display up to 21 more lines on succeeding display pages.

Catalog CMND Menu/Disk Map in ROM* Have easy access to sector mapping and know where your data is at any given time. This utility is located in ROM so it can be called and operated with ease. There are many command options, all executed with a single keystroke. Minnesota Education Computing Consortium.

Catalog Command (Apple III Business BASIC) Apple III Business BASIC makes a disk catalog available to the user as a listing on the computer's screen when the user types CATALOG or CAT. See bottom of following page for catalog display.

The catalog displays whether the file is locked (write-protected) by the ast erisk symbol. It indicates the type of file which is associated with the file's name. File types can include the following:

BAD	Damaged area in disk media.
BASIC	BASIC program which was stored with SAVE.
BINARY	Assembly language file.
CAT	Subdirectory or root directory.
DATA	Data file.
FONT	Binary file containing a character set.
FOTO	Binary file containing a graphics display.

PASCOD	Pascal code file.
PASDTA	Pascal data file.
PASTXT	Pascal text file.
RESERV	Reserved ID for new types of files.
SYSTEM	File containing a system program.
TEXT	Text file for use with BASIC.
UNKNWN	Open text file which has not been written to.

The catalog also displays the number of storage blocks occupied by the file, the file name, the date and time it was last modified, the date and time it was created, and the End Of File.

Catalogit!!* For all the librarians who don't have time to work on catalog cards. Permits you to make cards for almost any kind of material you have—records, books, films, tapes, and so on. You just fill in the information and tell the computer to print it. Package includes 500 computer catalog cards for starting out. 48K; cassette or disk. Right On Programs.

Cattle Feeding Economics* Given the cattle feeder's production cost, this program will calculate the maximum price that can be paid for calves and the minimum price that can be received for grown cows to produce the desired profit. Incidental and related costs are figured into these projections. AG-COM.

CATV CAble TeleVision.

CAVI 400* This board enables the Apple user to interface his computer with an industrial video recorder. Random access of video tape segments is allowed, along with software control of all the functions on the recorder. This system requires disk, color TV monitor, and a video tape recorder/player. BCD Associates, Inc.

Cavri Interactive Video System* A learning system that features videotaped teaching and computer-assisted instruction. Can be applied to fields such as sales, education, industrial training, advertising, and competency testing. 48K; BASIC or UCSD Pascal; selected VCR; and color monitor with audio. Cavri Systems.

Cavri V Interface Board* Hook up your Apple computer to a videocassette recorder and create computer-aided instruction. Many uses can be found for the combination of the computer and a VCR. This package comes with the Cavri board, software, cables, and a manual. Cavri Systems.

CavriDex* A package that allows you to store and catalog text information in the computer and record the audiovisual materials on videotape. These two systems can later be searched using descriptive words. Text can be stored in a file-screen format and the user determines the "to be continued." Cavri Systems.

CBASIC A popular BASIC compiler which can run on the 8080, Z-80, 8085, or 8086/8088 microprocessor chip. It is compatible with Apple computers having a suffient memory, an 80-column display, and a CP/M card.

CCD Charge Coupled Device. A storage technology using metal-oxide semiconductor capacitors. It transfers charge from one cell to another in a recirculating fashion.

CCP CP/M utilizes a portion of RAM to store the major components of the operating system. These components are BIOS, a bootstrap-loading routine, BDOS, TPA, and CCP. "CCP" stands for Console Command Processor. This portion of the operating system displays the CP/M system prompt (A> or B>). It then waits for a command from the user. When this processor receives built-in commands, it executes them immediately. If it receives a command which is a transient program (identified by .COM after the file name), it uses BDOS to locate the file on disk and load it to the computer's Transient Program Area (TPA). It then converts the instructions contained in this file into a file control block which allows the computer to access and execute this type of command. Once the file control block has been created, the CCP erases the file from memory and retains the control block for access and use by BDOS.

CCS Model 7710-01A Asynchronous Serial Interface* This interface board includes overrun, framing, and parity error checks; 8- and 9-bit transmission; programmable control register; one or two stop-bit operation; and more. California Computer Systems.

CCS Model 7811-01 B Arithmetic Processor* Make your Apple capable of advanced arithmetic pro-

---

CATALOG COMMAND DISPLAY The catalog display looks like the following:

```
TYPE      BLOCKS   NAME          MODIFIED  TIME    CREATED   TIME    EOF
--------------------------------------------------------------------------
*BASIC    00007    TIMESET       09/11/81  00:00   09/11/81  00:00   2896
*PASCOD   00004    TIMESET.INV   09/11/81  00:00   09/11/81  00:00   1536
*FONT     00003    APPLE         09/11/81  00:00   09/11/81  00:00   1024
```

cessing with this board. Some features are fixed point 16- and 32-bit operation, floating point 32-bit operation, binary data formats, and trigonometric and inverse trigonometric functions. California Computer Systems.

CDC Control Data Corporation, a manufacturer of large computer systems and peripherals, as well as diskettes.

CDILP Ceramic Dual-In-Line Package. See DIP.

CE12 Printer Interface* This device helps change your Apple and Centronics printer into a versatile text and graphics printing unit. Many types of printing modes can be used to gain full image quality. Hi-res graphics, rotation of image, variable size, screen printing, and much more are available. Comes with demonstration disk and manual. Interactive Structures.

Cell A repeated unit in a RAM chip storing one unit of information and returning it in response to a particular address signal.

Cells* Uses animated graphics to teach the parts and functions of cells. Drills and tutorials on the subject are included. If the student answers a question incorrectly, the computer responds with an explanation of the concept tested. Grades three through nine. Educational Activities, Inc.

CERDIP Pronounced "sir dip." CERamic Dual-In-line Package. See DIP.

CH An abbreviation used to describe the byte in the Apple computer's ROM which controls the cursor's horizontal position on the screen. Used in Assembly language programming.

CHAIN BASIC Statement. Integer BASIC can use the CHAIN command of Apple's Disk Operating System. In Integer BASIC the CHAIN command is used to associate one program with another, run the first program, load the second program and erase the first, but retain in memory the variables and arrays used or generated by the first program. If RUN was used to load and execute the second program, the first program, along with its arrays and variables, would be erased. RUN may be executed as a command statement in a program or in the direct mode. In a program it must be preceded by CTRL-D and PRINT.

It is possible to load and run one Applesoft program immediately after another by writing the last line of the first program as follows:

```
21120 D$ = CHR$ (4) : REM CTRL-D
21125 PRINT D$; "RUN DEMO 2"
```

These program steps would cause the computer to load and run Demo 2 from the first program. However, the first program and all of its variables and arrays would be erased.

The Apple DOS 3.3 "System Master" diskette contains a program called CHAIN. This program is a utility written in Machine language. It can be used to chain one program to another. According to the Apple DOS Manual, this program must be loaded to a particular memory address. This address is 520 in Applesoft with Applesoft in ROM. With Applesoft on disk you must use A12296. To use this utility program, add the lines to the end of the first program similar to those in the example.

```
21120 PRINT CHR$(4); BLOAD CHAIN, A520"
21125 CALL 520 "DEMO 2"
```

Chaining A method of allowing the execution of programs larger than the main memory of a computer by loading and executing modules of the same program sequentially.

Change a BASIC Line See Edit Mode.

Change Contents of a File See Edit.

Change Memory Byte with BASIC see POKE.

Change Memory Contents It is possible, in Machine language, to change the contents of the "next changeable location" of an Apple computer's memory. Type CALL-151 to enter the monitor. Then type 0 immediately after the prompt followed by 0000-00 and press the RETURN key. Then type :0F followed by a return. This will store the hexadecimal 0F at the next available location. To check the contents of this location, type 0 followed by 0000- and RETURN. This will display 0F on the screen to the right of 0000.

Change Name of a File Integer BASIC and Applesoft BASIC may utilize a DOS 3.3 command—RENAME—to change the name of a file stored on disk, without altering its contents. As a direct command to the computer you would use the following syntax:

```
RENAME <file name old>, <file name new>
```

In actual use the command might be similiar to the following:

```
RENAME DEMO 1, DEMO 2.
```

In CP/M, the REN command is used to change a file name. To use this command you would use the following syntax:

```
REN <file name new> = <file name old>
```

When using this command, include all extensions and the period which precedes the extension abbreviation. This is a built-in command in CP/M.

To change just the extension of the file name you would show the new extension at the end of the file name on the left side of the equal sign and the old extension at the end of the file name on the right side of the equal sign. For example:

REN DEMO.BAS = DEMO.BAK

In this example the computer would change the name of the file called DEMO.BAK to DEMO.BAS. See Extension, RENAME, and REN.

Change Program Line See Edit Mode and Editing.

Changing Surface of the Earth* Four lessons for students in grades four through ten. The first introduces the six geological eras and the concept of radioactive dating. The second explores the four layers of the earth's surface, types of rocks, and volcanic activity. The third talks about earthquakes, volcanoes, and tidal waves. The fourth discusses erosion and other kinds of weathering. 48K. BLS, Inc.

Channel Logical connection from a CPU to an I/O device. To optimize communications, channels may be multiplexed, have dedicated ports, or a dedicated channel processor. See also DMA.

Character Any letter, number, or symbol capable of being used to communicate with a computer.

Character Codes and Significance Apple computers, like most other microcomputers, use ASCII code to represent characters in the computer's memory. This "string to numeric" conversion is made since the computer can store only numbers in its memory. Each character on the Apple's keyboard, and a number of commands have associated ASCII characters. The ASCII characters which are associated with specific key stroke commands can be incorporated in Applesoft BASIC programs by using CHR$ followed by a number between 0 and 255. The computer will return the ASCII value of that number. For instance, CHR$(32) inserts a space; CHR$(4) issues a CTRL-D.

Apple II and Apple II+ ASCII Character Code Listing:

ASCII Codes from 96 to 255 are not available from the Apple II or Apple II+ Keyboard.

ASCII CODE (Decimal)	CHARACTER GENERATED	KEY SEQUENCE FOR CHARACTER	MEANING
0	NULL	CTRL @	Null string inserted.
1	SOH	CTRL A	
2	STX	CTRL B	Return to BASIC from monitor; stop program execution (BREAK).
3	ETX	CTRL C	Exit monitor to BASIC—Retain BASIC program.
4	ET	CTRL D	
5	ENQ	CTRL E	Display registers.
6	ACK	CTRL F	
7	BEL	CTRL G	Ring bell.
8	BS	CTRL H	Backspace.
9	HT	CTRL I	
10	LF	CTRL J	Line feed.
11	VT	CTRL K	Boot DOS from monitor.
12	FF	CTRL L	
13	CR	CTRL M	Carriage return (RETURN).
14	SO	CTRL N	
15	SI	CTRL O	
16	DLE	CTRL P	Boot DOS from monitor.
17	DC1	CTRL Q	
18	DC2	CTRL R	
19	DC3	CTRL S	Freeze screen output.
20	DC4	CTRL T	
21	NAK	CTRL U	Advance cursor 1 character.
22	SYN	CTRL V	
23	ETB	CTRL W	

Character Codes and Signficance

ASCII CODE (Decimal)	CHARACTER GENERATED	KEY SEQUENCE FOR CHARACTER	MEANING
24	CAN	CTRL X	Cancel line.
25	EM	CTRL Y	Invoke user defineable routine.
26	SUB	CTRL Z	
27	ESCAPE	ESC	Escape sequence.
28	FS	NOT AVAILABLE	
29	GS	CTRL-SHIFT-M	
30	RS	CTRL —	
31	US	NOT AVAILABLE	
32	SPACE	SPACE	Insert space.
33	!	!	Exclamation point.
34	”	”	Quotation marks.
35	#	#	Pound sign.
36	$	$	Dollar sign.
37	%	%	Per cent.
38	&	&	Ampersand.
39	’	’	Apostrophe—single quote.
40	(	(	Open parentheses.
41	)	)	Close parentheses.
42	*	*	Asterisk—multiply.
43	+	+	Plus sign.
44	,	,	Comma.
45	-	-	Dash.
46	.	.	Period.
47	/	/	Slash—divide sign.
48	0	0	Number 0.
49	1	1	Number 1.
50	2	2	Number 2.
51	3	3	Number 3.
52	4	4	Number 4.
53	5	5	Number 5.
54	6	6	Number 6.
55	7	7	Number 7.
56	8	8	Number 8.
57	9	9	Number 9.
58	:	:	Colon.
59	;	;	Semi colon.
60	<	<	Left arrow.
61	=	=	Equal.
62	>	>	Right Arrow.
63	?	?	Question mark.
64	@	@	At sign.
65	A	A	Uppercase A.
66	B	B	Uppercase B.
67	C	C	Uppercase C.
68	D	D	Uppercase D.

ASCII CODE (Decimal)	CHARACTER GENERATED	KEY SEQUENCE FOR CHARACTER	MEANING
69	E	E	Uppercase E.
70	F	F	Uppercase F.
71	G	G	Uppercase G.
72	H	H	Uppercase H.
73	I	I	Uppercase I.
74	J	J	Uppercase J.
75	K	K	Uppercase K.
76	L	L	Uppercase L.
77	M	M	Uppercase M.
78	N	N	Uppercase N.
79	O	O	Uppercase O.
80	P	P	Uppercase P.
81	Q	Q	Uppercase Q.
82	R	R	Uppercase R.
83	S	S	Uppercase S.
84	T	T	Uppercase T.
85	U	U	Uppercase U.
86	V	V	Uppercase V.
87	W	W	Uppercase W.
88	X	X	Uppercase X.
89	Y	Y	Uppercase Y.
90	Z	Z	Uppercase Z.
91	[	NOT AVAILABLE	Left bracket. (on Apple II or II+)
92	□	NOT AVAILABLE	Backslash (on Apple II or II+)
93	]	SHIFT-M	Right bracket.
94	Λ	SHIFT-N	Carat—exponent.
95		NOT AVAILABLE Apple II or Apple II+	Underline is available on Apple IIe

Character Devices Apple III SOS recognizes block devices and character devices in its communications with the world outside of the microprocessor chip. Block devices are those devices which can handle information in blocks of 512 characters. These devices include disk drives and hard disks. Character devices, on the other hand, only handle streams of single characters. These devices include the computer's console (keyboard and screen), serial devices such as modems and printers, and parallel connected printers.

Character File In CP/M a file containing character data, letters, numbers, or special characters. These files may have any file extension. By contrast, an object file, such as the .COM and .EXE files, may contain data which is not displayable as characters. Most data and programs that you write will be in text files. See Data File.

Character Generator A circuit which forms the letters or numbers on a screen or printer.

Character Generator* Allows the user to add text to the hi-res screen. Features include proportional spacing, custom placement of letters, letters that appear white even on a color screen, a screen that will hold seventeen lines of thirty-five characters, and clear readability. Also offers an advanced character design program. Disk or cassette. Steketee Educational Software.

Character Read from Keyboard BASIC. See INPUT.

Character Set The collection of characters available for display or processing on a particular computer or peripheral.

Character Set, Changing Dot matrix printers are capable of printing a variety of different character sets if instructed to do so. Applesoft uses the CHR$ (<number>) command in a program to accomplish such changes by passing CTRL (ConTRoL) characters to the printer. Refer to your dot matrix printer manual.

Character String Any combination of characters (numbers, letters, spaces, and symbols) enclosed in quotation marks. The Apple II, Apple II+, and Apple IIe computer can handle from 0 to 255 characters in a string. See String and String Variable.

Characters per Inch (10)—Normal Size Print To return to normal 10 character/inch print size, you must turn off all non-standard print options. See also Compressed Print, Double Width Type Format, and Type Formats.

Chart Master* Bar, line, or pie charts can be easily constructed for simple or complex business graphs. The results are professional and high-resolution. An instruction manual is included. 48K. Decision Resources.

Chart Writer: Written Natal Report* Even though it uses the latest computer disk technology, this report has a personal flavor. It will figure out a total natal horoscope for any place in the world and any date in history. A written report is generated based on planets in signs, planets in houses and planetary aspects. Offers a dual built-in planetary program. The output lists angles and planets with the written report. Some features are: 1) short range high accuracy or long range low accuracy; 2) aspects to angles; 3) solar houses; 4) geocentric or heliocentric; 5) user-defined aspects; 6) student key features; 7) write your own interpretations. This program will produce a good astrological horoscope for you. 32K; 48K. Matrix Software.

Check Writer* A small accounts payable, checkbook register, or budget aid system. It handles 400 checks per month—100 vendors on 100 separate accounts; prints checks, reports, or screen displays. 48K; DOS 3.3 and 80-column printer. Southwest Edpsych Services, Inc.

Checkbook* Keeps your checking account up-to-date. Cassette. United Software of America.

Checkbook Program* Keep track of all of your checks and deposits. Each transaction may be recalled by a user-defined field (i.e., check number, payee, etc.). Transactions are totalled upon request. Includes an instruction manual. 32K; 48K. Tape 'n Text-Williamsville Publications.

Checksum A field of one or more bytes appended to a block of n words containing a truncated binary sum or some other function value based on the contents of that block. The sum is used to verify the integrity of data.

Checkwriter* A system to print checks and store records on disk or printed out in check-register form. Records contain check number and date, payee's name and address, amount of check and comments or descriptions. Designed for use with check forms made by New England Forms. Computer House Div./FLC, Inc.

Chem Lab Simulation #1* A demonstration of laboratory procedures and calculations and processing of lab data. 48K; DOS 3.2 or DOS 3.3 Conduit.

Chem Lab Simulation #2* Two graphics simulations: 1) The Ideal Gas Law; 2) Entropy. 48K; DOS 3.2 or DOS 3.3. Conduit.

Chem Lab Simulations #1* A package of three programs suitable for college-level chemistry majors. Acid-Base Titration outlines common laboratory methods for defining acid concentrations. Avogadro's Number and Equilibrium Constant of a Weak Acid use the acid-base titration to build a base for further experimentation. The first derives Avogadro's number and the second uses the titration to find out the molar density of a weak acid. Package comes with a twenty-page manual that includes theory behind the experiments as well as other information. 32K. High Technology, Inc.

Chem Lab Simulations #2* A package of two programs designed for students of chemistry, that simulate the action of ideal gases. The first program shows how an ideal gas, confined in a box with a movable piston, reacts as variables are introduced. The second displays a box divided by a wall. You can either mix two gases or watch one gas expand into an empty chamber. The graphics abilities of the Apple II are employed to portray the results. A detailed manual is included and helps explain some key concepts, such as Boyle's Law, Charles' Law, Kinetic Molecular Theory, etc. 32K. High Technology, Inc.

Chem Lab Simulations #3: Calorimetry* Hi-res graphics demonstrate Hess's Law. Three chemical reactions create the problems to be solved. High Technology, Inc.

Chem Lab Simulations 4: Thermodynamics* Hi-res graphics take you through Heat of Vaporization and Theromodynamics of an Equilibrium Reaction. The slope of a plotted line is used to identify an unknown. High Technology, Inc.

Chem-Aid* A game to stimulate the learning of elements' names, the Periodic Table, and interesting facts about the elements. Ventura Educational Systems.

Chemical Equilibrium* An in-depth, ten-program set dealing with a variety of systems—estimations, calculations, concentrations, etc., and La Chatelier's principle. Programs For Learning, Inc.

Chemical Symbols* A program for drill and practice on element names and symbols. 32K; DOS 3.2 or DOS 3.3. Indian Head Software.

Chemistry* A fifteen-program set for junior and senior high school students. The set includes: gases, moles and formulas, equations, solutions, the Periodic Table, oxidation-reduction, acids and bases, organic chemistry, and more. A hi-res version uses graphs, charts, and pictures of molecules. The programs can be purchased individually or in a set. J & S Software.

Chemistry—Acids and Bases* Designed for high school and college students to develop basic understanding and skills with equilibrium constants and reactions. 48K; DOS 3.3. Encyclopedia Britannica Education Co.

Chemistry—Stoichiometry* For high school and college students to increase their skills and understanding of formulas, balancing equations, and mole computations. 48K; DOS 3.3. Encyclopedia Britannica Education Co.

Chemistry Analysis I* Deals with solutions to problems involving the mole concept and molality. Microphys Programs.

Chemistry Analysis II* Deals with problems involving normality, molality, and variations in freezing and boiling temperatures of solutions. Microphys Programs.

Chemistry I Disk* A twenty-two-program disk which contains: Calorimetry, Specific Gas Laws, Faraday's Law, The Mole Concept, The Normality Concept, Stoichiometry, Percent Concentration, EMF of Electrochemical Cells, Naming of Compounds Drill, and others. 24K. Microphys Programs.

Chemistry II Disk* A thirteen-program series covering The Molarity Concept, The Normality Concept, The Molality Concept, Stoichiometry, Percent Concentration, pH Concept, and more. 24K. Microphys Programs.

Chemistry With a Computer* Covers the following areas: equilibrium constants, gases, solubility products, moles, development of a scheme of analysis, intro to qualitative analysis, oxidation-reduction, solubility, change of state, and metric system. Programs For Learning, Inc.

Chemistry #1* 400 true-false, multiple-choice, fill-in, and short answer questions, covering a cross-section of skills and knowledge from various courses of study in chemistry. 48K; DOS 3.3. Academic Hallmarks.

Chemistry #2* An addition to the series of questions covered in Chemistry #1*, Chemistry #2 goes into further areas of chemistry. 48K; DOS 3.3. Academic Hallmarks.

Chequemate* A money management system for the home or small business. All lines of money and credit handling accounts can be recorded and balanced. Use it for credit cards, saving accounts, cash control, checking accounts, automatic teller transactions, etc. A full range of reports are available for printing and analysis. Masterworks Software,Inc.

Chinese Lessons* Eleven lessons contain Chinese greetings, times, seasons, numbers, foods and 200 commonly used terms. Graphics, sound, and color are used in each lesson. 48K. Computer Translation, Inc.

Chip A rectangular silicon die cut from a wafer. See entries by number for each commonly used chip.

Chip Select Most large scale integration chips normally have one (or more) chip selects. These activate the chip to examine the rest of its pins, for example, the address bus. This information will in turn specify a location/register within the chip. Muiltiple chip-selects can replace decoders external to the chip, but do require extra pins.

Chips—TTL $ CMOS* A library of printouts and truth tables for over 100 TTL and CMOS integrated circuits. They can be displayed on the screen or printed. Microproducts.

Chiron Package* Uses chiron elements that were developed by James Neely. This program will output standard planets and Moon and Lunar Node with positions for Chiron for the years 1900-2000. 8K; 16K. Matrix Software.

Chord Mania* Intended for practicing chords including recognition of four-voice chords in combinations of chord qualities (all the triads and five separate seventh chords) and inversions. 48K. Micro Music, Inc.

CHR$—BASIC Function CHR$ converts an ASCII code to its character equivalent. The format is:

CHR$ (<number>)

For example, CHR$ (10) sends a CTRL-J or line feed to the computer screen or to a printer or other peripheral if connected to it. This function is used from within programs and not as a direct command to the computer.

Christmas Album* Christmas music that can be played individually or as a "record." 48K. MPA Enterprises.

Christmas Story, A* Stories of the Bible told in ten high-resolution color graphics scenes. Also gives you seven Christmas Carols that are an important part of the scripture story. Homeware.

Chronograph* An RS-232C compatible calendar/-clock that features quartz-crystal control and the ability to control household systems such as security and lights. An independent unit with a vacuum fluorescent display, the Chronograph continues to work even after your computer is shut off. Mini Microcomputer Software.

Chumash Compu-Flash Cards* Designed for the beginning student. The user can choose a word set from each parasha and study the words at an individual pace. The computer responds to an incorrect answer, with the correct answer. The words, chosen by educators experienced in Chumash, cover significant areas. The display is clear and Hebrew characters, including vowel sounds, are precise. Institute for Computers in Jewish Life.

Circle Graph* Creates a circle graph for as much as ten pieces of data. Paul's Electric Computer.

Circuit Analysis* Checks your specifications to assist you in designing circuits. Different adaptations can be incorporated through input data analysis and experimenting with variations. Requires 48K. Apple Computer, Inc.

Circuit Analysis Programs* Simulate a circuit board through a technique called "bread boarding." The program can analyze outputs of components on a circuit, including AC and DC circuits. 48K. Charles Mann & Associates.

Circuit Boards "Circuit Boards" is a generic term used to describe printed circuit boards which combine various electronic components such as chips, resistors, transistors, capacitors, etc., with wiring which is an integral part of the board. Such boards are made of fiberglass or epoxy which has been coated with a thin layer of metal. This metal is then etched away to what is called "traces" which conduct signals from one place on the board to another. These traces take the place of wires. The components described above are then connected to the board directly (soldered on) or with sockets. The main board of an Apple computer is a circuit board. Peripheral controller cards, asynchronous input/output boards, video enhancement cards, memory expansion cards, and all such devices which expand or enhance the usefulness of the Apple computer are circuit boards.

Circular Motion* An educational program for the college physics student. Some concepts discussed are: speed and forces involved when one object rotates around another, as a satellite speeds around a planet; objects whose speed is constant and others whose motions vary; components of acceleration and velocity (angular and tangential) with their vector directions displayed; solution of simple harmonic motion by use of the reference circle method. Concepts are thoroughly covered in visual and mathematical terms. 48K. Cross Educational Software.

Circulation—Organs* A discussion of the circulatory system including the heart, arteries, lungs, and blood. Fifth grade and older. 32K. Micro Power and Light Company.

Circulation—System* This program discusses the systemic and pulmonary circulatory systems. Junior high school students and older. 32K. Micro Power and Light Company.

Claim To Fame & Sports Derby* An add-on module for the Word Race* system. The three modules include over 1800 questions concerning famous people and sports personalities. Also includes Intermediate Word Race, a definition game for early teens. Machine language. 48K. Requires Word Race*. Don't Ask Computer Software.

Class Scheduling System, The* Create a lists of required courses, optional courses, students schedules, and master rosters. Schedules are designed to include lunch hours, study halls, and mandatory classes. Student suggestions for alterations in scheduling will be summarizing. A maximum of 2,400 students and 1,000 courses may be handled efficiently. 48K; printer. Charles Mann & Associates.

CLC The Machine language mnemonic code which instructs the computer to CLear Carry flag in the computer's status register. This command sets that particular bit to 0. See Carry Flag.

CLEAR Applesoft BASIC and Apple III Business BASIC. Use the command CLEAR to set all variables used in a program to zero and to set all string variables to null. This procedure allows the pro-

LANGUAGE	COMMAND OR KEY SEQUENCE
Integer BASIC & Applesoft BASIC	CTRL-SHIFT-P Key sequence.
Integer BASIC & Applesoft BASIC	GR in low-resolution graphics (command).
Applesoft BASIC	HOME command anytime you are in Applesoft BASIC.
Applesoft BASIC	HGR in high-resolution graphics.
Applesoft BASIC for graphics page 2.	HGR2 in high-resolution graphics
Integer BASIC & Applesoft BASIC	CALL-936 in a program or entered directly.

Each of the methods described above (except the graphics applications) will clear the screen and home the cursor (return the cursor to the upper left corner of the screen.)

gram to be rerun with program-generated or user-supplied input. Integer BASIC uses the command CLR to accomplish the same thing.

Clear Signal to place a device or a circuit in an initial, usually zero, state.

Clear the Screen From BASIC. Press CTRL-SHIFT-P. See HOME.

Clearing the Computer of Stored Instructions In Applesoft and Integer BASIC, the NEW command clears the computer of all programs, instructions, and data currently in memory.

Clearing the Screen A number of methods are available for the Apple computer user to clear the monitor screen of text and graphics displays. These are listed above.

Client Billing System* A single transaction will enable this handy program to add, modify, and bill clients. The billing procedure may be either hourly or on a flat rate basis. Up to 200 clients, 500 hourly rates, and 900 transactions may be handled efficiently. Ideal for the small business owner. 48K; printer. High Technology, Inc.

Client Management System 2.0* A complete system for billing purposes and client listings. Reports include accounts receivable, case histories, and billing statements. This system uses several utilities and security protection. 64K; printer. Compu-Law, Inc.

Client Records/Bill Preparation* Keep a telephone listing of your clients and a detailed record of their previous bills. Features the ability to record and prepare your own bills. 32K. Instant Software.

CLK CLocK. The reference timing source in a system, which provides regular pulses that trigger or synchronize functions. Most microprocessor clocks operate in the range of 1 to 8 MHz, whereas real-time clocks usually operate at 1, 10, or 100KHz. A system usually requires a CPU clock, a timer clock, and other clocks for specific I/O devices.

Clock* A program that helps students learn to tell time. Offers three different formats, records errors, gives graphic reinforcement for correct answers. 48K ROM; Hartley Courseware, Inc.

Clock Boards See Hayes Stack Chronograph*, Time Clock*, and Time Master*.

Clock Cycle The clock cycle is the time required to execute a read or write operation. The 6502 microprocessor chip in the Apple II and Apple II+ uses 1 MHz to accomplish this process. The Apple IIe clock cycle is 1.023 MHz. The Apple III clock cycle is 1.4 MHz on the average with a peak of 2 MHz attainable.

Clock Frequency The oscillation rate of a clock, usually expressed in MegaHertz. Also known as Clock Rate.

CLOSE An Apple DOS 3.3 command associated with sequential text files and random access files. Prior to writing to a file on disk, the file must be opened. If file writing operations are interrupted or finished, an open file must be CLOSEd with a command written into the file writing program you are using. If the file is not closed, the data stored in the file will be lost. If this command is used in a program it must be preceded by PRINT CTRL-D. The command may also be used as a direct command to the computer. The syntax for this command is:

```
CLOSE <file name>
```

followed by pressing the RETURN key. If no file name is given after this command, all open files on the disk being used will be closed.

Close Disassociation of a file from a particular program, including flushing unwritten buffers and updating the directory and File Allocation Table, if required.

Closed-Apple Key The Apple IIe and Apple III computer keyboards have two special keys called the "Closed-Apple" key and the "Open-Apple" key. These keys are used to extend the capabilitiy of regular keys and to perform specific diagnostic tests. On the Apple III, the Closed Apple key is used to triple the speed of repetition from eleven characters per second to thirty-three characters per second when a key has been held down long enough to cause its repeat features to start. This key is called the "Solid Apple" key on the Apple IIe. On this computer a built-in diagnostic, started by pressing the Solid Apple key, acts the same as pressing the button on game controller number 1.

CLOSE# An Apple III Business BASIC command which is included in a program line. This command instructs the computer to close the text or data file where number matches the number in the command.

Closing a Disk File BDOS (BASIC Disk Operating System) in CP/M has a number of functions. Function 16 closes a file, sends the address of the file to the program control block, and records new information in the file control block on the disk on which the file is stored.

Clouds* Discusses cumuliform clouds and their causes. Information Unlimited Software.

CLS BASIC Statement. CLS Statement is used to Clear the Screen. The format is:

```
CLS
```

CMA Light Pen* A customized light pen that requires no free slot for operation and can be connected quickly for easy input. Charles Mann & Associates.

CMP CMP is the Apple Assembly language command for CoMPare. This command instructs the computer to compare the value of the contents of the accumulator with the same immediate input—use CMP #$(value)—or with the contents of a particular memory location—use CMP $(<value>).

Coax Coaxial cable. A transmission line with an inner conductor and an outer shield conductor.

COBOL COmmon Business Oriented Language. A high-level programming language developed for business applications, with statements based on English. Popular on mainframes and available for the Apple.

COBOL-80* Everything you need to write COBOL programs on your Apple computer is provided in this software/hardware package. The ANSI Standard 1977 COBOL is used with a few additional upgrades. Program chaining is supported as well as four kinds of data files, full-screen I/O, single command editing, and more. A Macro-80, COBOL-80 Compiler, LINK-80, CREF-80 COBLIB, LIB-80, and a Reference Manual are included. Microsoft Consumer Products.

Code, ASCII Character See Character Codes and Significance. See ASCII.

Codec COder-DECoder. A chip providing the essential translation of analog to digital conversion.

Codes, ESCAPE The ESCape key on the Apple computer keyboard may be used in conjunction with eleven specific keys. The use of the ESCape key with any of these eleven keys take the keyboard out of the normal Apple input routines. Eight of these keys are cursor movement keys; one clears the line on which the cursor rests to the end of the line; one clears from the cursor to the end of the screen and the last clears the screen and homes the cursor in the upper left corner of the screen. See Escape Codes for a list of keys and functions.

Coexist-Population Dynamics* Up to three populations can be evaluated for survival given a specific food supply. Two of these may be compared for analysis. 48K. Conduit.

Coin Collector Catalog, The* A maintenance program for collectors. It consists of six programs in which information can be searched, sorted, printed, changed, or deleted: 1)Foreign Coin List; 2) Domestic Coin List; 3) Meetings List; 4) Sources List; 5) DataBase; 6) File Transfer. Manual is included. 48K. Andent.

Cold Boot To boot CP/M from a cold start on the Apple II, II+, or IIe computer you must first ensure that your CP/M (or Z-80) card is in slot 4 and that your 80-column card is in slot 3. The 80-column card should be connected to your monitor. Your system must also have at least 16K of RAM expansion if it is an Apple II or Apple II+ computer. If your system is configured in this fashion and has two disk drives, insert the CP/M operating system disk in drive number 1 (drive A). Close the disk drive door. Turn on the computer. Some CP/M system disks will put the user immediately into CP/M, others provide the user with a menu containing a number of options such as:

1. Execute one of the above listed programs.
2. Back up your diskettes.
3. Display help messages.
4. Exit to CP/M.

With the latter type of CP/M system diskette, choose the option which places you in CP/M.

Cold Start To initiate use of Apple DOS 3.3 on the Apple II, Apple II+, and Apple IIe computer you must insert the DOS 3.3 System Master diskette into disk drive number 1, close the disk drive door, and turn on the computer. This process is called a cold start as the operating system is loaded into a computer which was turned off prior to loading. The disk operating system will be loaded into the computer's memory and all of its commands will be accessible to the user. With the Apple III computer, the operating system for the computer along with its device driver programs and its Apple Business BASIC interpreter are loaded in the same fashion by inserting the Boot Diskette provided with the system. SOS 3.1 (Sophisticated Operating System) is loaded to the Apple III by this procedure.

College Package* Includes Function Grapher, Area Under a Curve, Derivative of Sine, Graphic Integration Theory, Limits of Sequences, Midpoint Rule and Trapezoidal Rule, Rational Function Grapher, Solids of Revolution, and Taylor Series. Math Software.

Colon (:) Drive Name Delimiter (CP/M). In a file name, the : and . are specified to delimit drive name and extension respectively. Parameters on DOS commands can be delimited (separated) by these characters: space, comma, semicolon, equal sign, or tab key.

Colon (:) Used for multiple statements on one line. You can put a colon (:) at the end of one statement and continue entering another statement on the same line, without giving a new line number. The line number at left refers to all statements on the line. An apostrophe (') allows a comment or remark to be added after a statement with or without a separating colon. See BASIC Statements, Multiple On One Line.

Color Calendar* A helpful scheduling tool for the busy person. This calendar will review at a glance birthdays, anniversaries, and appointments, and it will also automatically enter repeated dates. Displays are in hi-res color graphics. Spectrum Software.

Color Control Apple III Business BASIC uses the BGRAF.INV module to give the user the capability of controlling pen (line and dot) color and fill (background and erase) color in graphics displays.

Color Me* Children can learn color graphics by painting pictures with a thirty-two color range. The joystick serves as the brush and coloring information may be saved for changing the scheme later. Versa Computing, Inc.

Color PI* A colorful graphic tutorial for learning decimals. Up to 1,000 decimal places may be displayed with each digit a different color. Paul's Electric Computer.

Color Video Port The Apple III computer is equipped with a socket and supporting circuitry to connect the computer to a color video device. The socket is mounted on the back of the computer case and consists of a 15-pin D type connector. It can pass color, black and white, and composite RGB output. This feature enables the Apple III user to connect to black and white and other monochrome displays, color monitors, RGB monitors, video tape systems, and any other compatible devices.

Coloring Board, The* Create, alter, and store images in either black and white or any of six colors. Uses the keyboard and a detailed menu. 48K; joystick. Software Tech for Computers.

Colors, Hi-Res Colors are available on the Apple II, Apple II+, and Apple IIe graphics screen by using the HCOLOR= command. Only eight colors are available on this screen. These colors are shown below with their color number.

COLOR CODE LIST

DECIMAL CODE	HEX CODE	COLOR
0	$0	Black 1
1	$1	Green
2	$2	Blue
3	$3	White 1
4	$4	Black 2
5	$5	Orange
6	$6	Blue
7	$7	White 2

Colors, Lo-Res When using lo-res graphics the Apple will generate sixteen different colors. The names and numbers of the colors are listed below; you can adjust your color monitor so that they appear correct to you. Colors produced by the Apple composite NTSC (q.v.) signal may blur at the edges where the area contacts another color; this is due to the way the color signal is interpreted by the phosphors on the screen.

0 = black
1 = magenta
2 = dark blue
3 = purple
4 = dark green
5 = grey

6 = medium blue
7 = light blue
8 = brown
9 = orange
10 = grey
11 = pink
12 = green
13 = yellow
14 = aqua
15 = white

Colors Available on the Apple III The Apple III can generate sixteen colors in Business BASIC. These colors depend upon having the .GRAFIX driver in use. They are identified as follows:

DECIMAL CODE	HEX CODE	COLOR
0	$0	Black
1	$1	Magenta
2	$2	Dark Blue
3	$3	Purple
4	$4	Dark Green
5	$5	Grey
6	$6	Medium Blue
7	$7	Light Blue
8	$8	Brown
9	$9	Orange
10	$A	Grey
11	$B	Pink
12	$C	Green
13	$D	Yellow
14	$E	Aqua
15	$F	White

To use these colors, the graphics module must be activated by using:

```
OPEN#1, ".GRAFIX" CC
```

in a program line and

```
INVOKE "BGRAFIX>INV"
```

must also be given. To use a specific color for points and lines,

```
PERFORM PENCOLOR(%7)
```

sets the color to light blue.

COLOR= Command used in Applesoft BASIC and Integer BASIC to instruct the computer to display on the low-resolution graphics screen. The next point or points (until a new color command statement is passed) is in the specified color. The Apple II, Apple II+, and Apple IIe computers can generate up to sixteen colors on the low-resolution screen. A table of the colors, their associated hexadecimal code and associated decimal code is presented below. To use these colors on the low-resolution graphics screen, you must first type GR followed by RETURN. Then type COLOR= is followed by the desired color number (COLOR=10). Then type plot X coordinate, Y coordinate followed by return, and a point of the desired color will be plotted.

Apple II, Apple II+, and Apple IIe—Color Codes

DECIMAL CODE	HEX CODE	COLOR
0	$0	Black
1	$1	Magenta
2	$2	Dark Blue
3	$3	Purple
4	$4	Dark Green
5	$5	Grey
6	$6	Medium Blue
7	$7	Light Blue
8	$8	Brown
9	$9	Orange
10	$A	Grey
11	$B	Pink
12	$C	Green
13	$D	Yellow
14	$E	Aqua
15	$F	White

COM COMmand file. In CP/M, the extension .COM is used after a file name to indicate that the file is a command (Transient Command) file. These files contain executable programs which provide operations not available as built-in commands. Such files are treated as transient programs which are copied into memory and run.

Combination Input/Output Interface Board* Four analog inputs (Apple paddle compatible), eight relay isolated outputs, and eight optically isolated inputs are offered with this system. The signals are compatible with industry standard twenty-five pin connectors, and the male to male cable required for interface to the analog signals is included with the package. Standard PEEK and POKE statements are used to communicate with the interface. This board fits into any one of the input/output slots of the computer. IEM Screening Systems, Inc.

Combinational Logic A circuit with Boolean logic functions and no memory.

Combined Enhanced Graphics Software* A menu-driven program that prints the graphics screens of the Apple with single keystroke simplicity. Menu selections are provided for printer and interface; another menu controls all other functions including an auto-load feature that automatically loads a hi-res picture from the catalog listing. A single keystroke allows you to view either hi-res screen before printing. Left, center, or right justification are possible, as well as two picture sizes, and black-on-white or white-on-black printing.

While the range of options may not be as great as with other more sophisticated graphics screen dump programs, the simplicity and ease of use make it a valuable program. Computer Stations, Inc.

Combined Graphic Writer* A printer driver that translates the characters in sequential text files into alternate characters. The graphics package allows the user to print text in a variety of type styles using the graphics mode on a number of printers.

The user can select any of twenty-one different fonts supplied with the program. These character sets include some of the ones in Apple's Applesoft Tool Kit. Using the utilities provided with that other program, it is possible to design additional character sets or modify existing ones. The output can be formatted using AppleWriter II*, ScreenWriterII*, or BASIC. Special control characters need to be imbedded in the text to activate the functions available in the software (such as underlining).

Once the text file is generated, Graphic Writer is used to print the text. It can be loaded and called from within a BASIC program. Printing speed is slower than normal, but the results are quite unique. The initial configuration is done from a menu which includes a large number of printer and interface types. Once configured for your system, the program need only be RUN. Computer Stations, Inc.

Combinological Dial Printer* Can be used with most plastic wheels currently available to generate finished 360-degree or 90-degree dials. Exact positioning is a feature. Requires either the Epson MX-70*, the MX-80 FT* with PH-8 graphics or the Paper Tiger IDS 445* with graphics. Matrix Software.

Comma (,) The comma is used in Integer BASIC with the input statement to signal to the computer that the next string is a variable name to be used to input a number or letter if the variable appears after quotation marks. For example:

```
15 INPUT "WHAT IS YOUR NAME?", NAME
```

The comma is used with the PRINT statement, in Applesoft BASIC and in Integer BASIC, to tab. The first comma in a print statement containing more than one comma starts the output in horizontal position 17. The second comma starts output in horizontal position 33 if nothing has been printed between position 24 and position 32. Commas are used in both languages in data statements to separate data entries.

Comma (,) DOS commands can be delimited (separated) by any of these characters: space, comma, semicolon, equal sign, or tab key. In a file name, the : and . are specified to delimit drive name, and extension respectively.

Comma (,) In PRINT, each group of sixteen spaces across the print line is called a print zone. A comma (,) in an PRINT <list of items to be printed> means "start printing the following item at the start of the next print zone." Contrast this with the semicolon (;), which means "the next item is to print immediately after this one, without a space between." The print zones begin in columns 1, 17, 33, 44, & 65. See Print Lines.

Command A statement that causes a computer to carry out a specific action. Commands differ from instructions in several ways. A command is usually a complete specification of an action, while dozens or hundreds of instructions are combined to make a useful program. Commands are usually acted upon immediately by the computer, while instructions are saved for later execution in a program. Commands are acted on by the operating system of the computer, while instructions must be processed by a particular program such as the BASIC interpreter, a FORTRAN or Pascal compiler, etc. For the Apple, command usually is a synonym for DOS Command.

Command Control Processor See Console Command Processor.

Command Field In Assembly language, a program line is made up of a line number, an optional label field, a command field, and a comment field. The command field contains the line's Op code and operand (if there is an operand).

Command File In CP/M, a file which contains an executable program which supplements the built-in commands of the CP/M system. These files are stored on disk with a .COM extension given to the file name to differentiate this type of file from others.

Command Processor In CP/M, a program which accepts a command (usually from a keyboard) and causes it to be carried out. Some command processors contain the programming required for all commands they process. Others do not carry out any commands directly. Instead, they examine the command, determine what other program (if any) can carry out the command, locate the required program, and start it running. Still another type of command processor carries out some commands directly (internal commands), but locates and runs other programs for some commands (external commands). See DOS Commands.

Commands, DOS The Apple computer's disk operating system makes twenty-eight file handling commands available to the computer user. A number of these commands may only be used from within a program, a number may only be used with a specific type of file, and a number may be used with only Integer BASIC or Applesoft BASIC. Twenty of the twenty-eight commands may only be used with a named file. The remainder are general use commands. See DOS commands for a list of these commands and a table indicating how they may be used.

Commands, Monitor The Apple computer's ROM contains a program which controls all programs used on the Apple and which is used by all of these programs to communicate with the computer. This program is called the System Monitor. It can be accessed by typing CALL-151 followed by RETURN. The computer responds to this CALL by placing the user in the monitor and by displaying the monitor prompt on the screen. This prompt is an asterisk (*). Once in the monitor the user can: examine the hexadecimal contents of a single memory location or a series of locations;change the contents of a specific location or a consecutive series of locations; move and compare values in a specific range of locations; save and load memory values using a cassette tape recorder; and run or list Machine language programs. Also, it is possible to invoke the Apple's mini-Assembler; display the contents of registers; set inverse or normal display modes; reenter the language resident in ROM; add or subract two values and print the result; divert output to or accept input from a specific slot; and jump to a Machine language subroutine at location $3F8. For a more detailed discussion of these commands and their format, see MON and Monitor—Test Environment.

Comment Field A field within an instruction, which contains explanations or remarks. Its contents are ignored by the interpreter, the compiler, or the Assembler.

Comments in BASIC Programs—REM Use REM as a way of including remarks or explanatory comments in a program. For Example:

```
20 REM Just a comment
40 LET X = 1: REM Just a comment
```

The colon (:) allows multiple BASIC statements on one line.

Commercial Account Profitability Analysis* Assists financial institution managers to figure budgeting and viability of commercial accounts. A number of loan activities are considered (loan balances, rates, time deposits, service charges, etc.) in tabulating the profit/loss margin of accounts. Easy installation, Applesoft compatiblity, and Apple III features all contribute to make this a powerful package. Data Systems, Inc.

Commercial Account Profitability Analysis* Helps managers determine the profit or loss on commercial accounts. Income can be increased by asking customers to hold a larger minimum balance or assessing a hard dollar charge against DDA balance. Pacific Bancorporation Data Systems, Inc.

Commercial Cattle Feeding Program* Records for small to medium feedlots are maintained by this program that also prints out pen analysis, feed bill, accounts receivable, and final closeout records. This menu-driven program is supplemented by a comprehensive user's guide and performs extensive error checking upon data entry. Hi-Plains Systems, Inc.

Communications* Teaches elementary students about the history of communication from early days to the modern technologies. Disk or cassette. Right On Programs.

Communications Interface Card An Apple computer provides the user with the ability to expand the capacity and capability of the originally purchased system by installing a variety of circuit boards in the expansion slots on the computer's main board. One such circuit board or card is a communications interface card. This device allows a computer to communicate with other computers via telephone lines. It must be connected to the telephone lines with a modem which converts the signals generated by the computer to signals acceptable by telephone lines. Another modem at the other end of the line converts these signals back to a form which the destination computer understands. The modems also synchronizes the signals of the two computers. The communications card contains the protocol which allows the two computers to communicate. It controls the rate of data transfer (baud rate), sends line feeds, answers line feeds, dials destination computers, answers incoming calls, and otherwise controls communications. These cards are serial interface cards which cause the computer to receive and transmit data over a single wire.

Communications Software See Absolute Security; A-C-C-E-S-S; Answering Machine; Apple Access III; ASCII Express II; Apple Bulletin Board Systems/-ABBS; Apple Mechanic; Apple Terminal; Auto-Modem; AutoTerm; Basic Interactive Terminal Software (B.I.T.S.); Compuserve; CROSSTALK; D.

C. Hayes Micromodem; Data Capture 4.0; Datacomm; Datalink; Data*trans; D-Cat; First Edition; Flexiterm; Message Trio; Micro-Communicators; MicroModem IIe; Signalman Mark I Modem; Smart; Smartmodem; Snowatch; Source, The; Type 'N Talk; Typeface; V100 Interactive Voice Synthesizer; Variable Message; VisiTerm; Voice Entry Terminals; Voice Input Module; Voice, The; Voter 30; VT-100 Emulator; Z-Term.

Comparative Buying* Will help to increase your understanding of smart shopping and possibly save you some money. Four topics are discussed: 1) comparative buying concepts; 2) buying effectively; 3) merits of buying with cash as opposed to credit card buying; 4) making decisions before purchasing. MCE, Inc.

Comparative Policy Analysis* Helps the insurance professional compare an existing life insurance policy against a new package. Charts and tables are created to visually demonstrate the differences and benefits. 48K. Insurance Micro Software, Inc.

Comparing Memory The Apple Computer's monitor ROM may be used to compare the contents of two memory locations. First type:

```
CALL-151
```

to enter the monitor. When you see the monitor prompt (an asterisk), enter the first location in hexadecimal code, a period, and the second location followed by V and RETURN. This causes the computer to compare (Verify) the contents of each location and to display the address and contents of the first location if there is a difference. If there is no difference, nothing is displayed.

Comparing Strings Character strings (any combination of letters, numbers, character symbols, and spaces enclosed in quotation marks) may be compared in Integer BASIC, for equality only, and the result of comparing the string may not be printed directly. An example of such a comparison is given below:

```
5 REM A PROGRAM WHICH COMPARES
STRINGS
10 DIM S$(10),x$(10)
20 S$ = "*+-/@%!="
25 PRINT "THE FOLLOWING LIST OF SYM-
BOLS IS STORED"
27 PRINT "IN MEMORY IN THE ORDER
SHOWN."
30 PRINT : PRINT "* + - / @ % ! ="
35 PRINT "INPUT ONE OF THESE SYMBOLS
FROM THE"
36 PRINT "KEYBOARD AND THE COMPUTER
WILL TELL"
37 INPUT "ITS POSITION ON THE LIST.";X$
40 FOR I = 1 TO LEN (S$0)
50 NEXT I
55 HOME : PRINT : PRINT "THAT IS NOT A
SYMBOL ON THE LIST": PRINT
 : PRINT : PRINT
60 GOTO 25
65 PRINT X$; "IS SYMBOL NUMBER",I;"ON
THE LIST"
```

Line 45 compares the strings. Strings may also be tested for inequality by using the pound (#) sign in Integer only and ≠ in Applesoft.

Comparison Instruction Apple Assembly language has three instructions available to perform comparisons. The mnemonics for these instructions are CMP, CPX, and CPY. CMP instructs the computer to compare the operand value with the accumulator. CPX instructs the computer to compare the operand with the value in the X register. CPY gives the same instruction for the value in the Y register. For each of these operations, if the operand is smaller then the register value, the carry flag is set, and the Z flag is cleared in the processor status register. If the operand is equal to the value in the specified register, both flags in the processor status register are set. If the operand is greater than the value in the specified register, both the carry flag and the 2 flag are cleared.

Competency Manager* A program for school counselors to keep records of students' progress. You can define your school's specific set of competencies for student achievement, and letters can be generated regarding each student's status. Omnico.

Compete-Plant Competition* Includes seven studies which help students learn about the growth features of plants. Effects of overcrowding, soil quality, and plant interaction are discussed in relation to plant dominance. Conduit.

Compile Time The point in the processing of a program when it is being translated from source code to object code by a translator (compiler or Assembler).

Compiler A translation program which converts high-level instructions into binary instructions for direct processor execution. Any high-level language, such as BASIC or COBOL, requires a compiler or an interpreter.

An interpreter translates each statement of the program each time the statement is executed, whereas a compiler translates the complete program once, producing object code that can be executed repeatedly. Any change in the program requires recompilation. The code produced by compilers may be longer and/or slower than the code generated from Assembly language source code.

Compiler Programs There are a number of commercial programs available to compile programs in a variety of languages and operating systems for Apple computers. A number of these programs are listed below:

LANGUAGE	PRODUCT NAME	MANUFACTURER
Applesoft BASIC	Applesoft Compiler	Hayden Software
	The BASIC Compiler	Datasoft, Inc.
	BASIC Compiler	Microsoft
	The Einstein Compiler	The Einstein Corporation
	BASIC Compiler & Run Time	Softech
	Speed Star	Southwestern Data Systems
CP/M	CB-80	Digital Research
COBOL (CP/M)	COBOL Compiler	Microsoft
COBOL 80 (CP/M)	COBOL 80	Microsoft
FORTRAN (CP/M)	FORTRAN 80	Microsoft
FORTRAN (CP/M)	FORTRAN Compiler	Microsoft
Integer BASIC	Integer BASIC Compiler	Synergistic
	TASC Compiler	Microsoft

Compilers There are many language compilers to assist the user with programming. A compiler will read the source code and convert it to object code. It will also flag syntax or language construction errors. Some compilers call library data files. They have different speeds of operation, and of course, separate compilers cover different programming languages. There are many compilers that have similar functions and all are written in Machine language. Listed below are some of the popular programs presently on the market. Further investigation by the reader may be necessary to find the one that best suits their needs.

Applesoft Compiler	Microsoft Consumer Products
BASIC Compiler	Microsoft Consumer Products
COBOL Compiler	Microsoft Consumer Products
C.O.R.P. Program Generator	C.O.R.P. Dynatech Microsoftware
C/65	Optimized Software
DMA "C"	Dynamic Microprocessor Assoc.
Flash! (Integer BASIC Compiler	Laumer Research
Fortran 80	Microsoft Consumer Products
Hayden Applesoft Compiler	Hayden Book Company
Integer BASIC Compiler	C H Galfo
Level II COBOL	Micro Focus
PBASIC-DS	Decision Systems
Speed Star	Southwestern Data Systems

Complementing The action of changing each 1 to a 0, and each 0 to a 1. The action of inverting values.

Complete Disk System* A disk system designed to be the center of a larger system of programs. The M-64 is a complete package that has straight batch printer output and user screen interaction. Although M-64 is also a chart casting program, it has many other uses: a file keeper that creates and keeps client or research charts as records; can provide instant analysis of client records; a chart printer; and a utility program. Best of all, it is the center of many programs that interact with M-64 to give the user a lot of flexibitity. 32K; 48K. Matrix Software.

Complete Graphics System, The* A package that offers more than 100 hi-res colors, hi-res text (user defines fonts), delivers colors and multiple figures with Machine Code speed, and definable paintbrushes. Manual included. Penguin Software.

Complete Graphics System, The* This utility package includes: creating 3-D graphics, hi-res pictures, and tables; editing; adding phrases to pictures; and coloring. 48K. Co-Op Software.

Complete Graphics System II, The* Graphics and text are easily combined for presentations and educational applications. Illustrations may be in either 2- or 3-D. 48K; joysticks. Penguin Software.

Complete Mailing Label and Filing System (Version 2), The* This updated version of Mailing Label and Filing System increases your label-making options, with four different print formats, multiple number label duplication, easier input of data, and easier formatting capabilities. 48K. Avant-Guard Creations.

Complete Progressions & Directions* Computes a natal chart and some of the progressions and directions to that chart. Output is provided in Date when progression is exact and "What progressed to What" on that date. If progessions and directions are chosen, the "hits" come out in chronological order. There are many options, such as: if you like to put points into the radix, other than the standard planets and angles, you may input as many as ten optional sensitive points. You may direct to planets, angles, node, optional points and house cusps or you may direct planets, angles, and optional points. You may use a variety of methods: degree for a year arc, naibod arc, true solar arc, ascendent arc, vertical arc, secondary progressions, and a special factor that can be applied to all arcs. 32K; 48K. Matrix Software.

Complete Synastry Package* A flexible synastry package that offers the user major chart comparison techniques. The user will be able to experiment with various chart comparison methods. You can choose calculations for one of seven charts: 1) Progressed Relationship; 2) Progressed A; 3) Progressed B; 4) Composite; 5) Relationship; 6) Radix B; 7) Radix A. 32K; 48K. Matrix Software.

Complex Mathematics* Perform complex-number mathematical computations in BASIC rather than FORTRAN. The eight programs included in this package are Absolute Value, Complex Exponential, Complex Addition, Subtraction, Multiplication and Division, Nth Roots of a Complex Number, and Complex Number to a Real Power. Hayden Book Company.

Composer's Assistant* Automatic transcription and hard copy score printing for use by composers. First, the composer performs on the alpha Syntauri keyboard. Then, his work can be viewed on the screen or printed out into hard copy for review. Pieces performed on the keyboard will later be transcribed into notation similar to piano scoring. With the Syntauri's Metatrack recording system, the composer can work with full orchestral ideas and then produce video displays, instrument by instrument. 1/16th note and rest resolution. Adjusts for performance timing such as leading the beat. Musicians and lyricists can add expressions with the built-in text editing feature. 48K. Syntauri.

Composites & Relationship (An Astrology Program)* Performs two popular synastry methods: composite charts and relationship charts. The composite chart is created from midpoints between two planets in the charts of two individuals. The relationship chart is cast for the midpoint, in time and space, between the birth of two people. This program shows house cusps and planets for the new chart. 8K. Matrix Software.

Compressed Print Dot matrix printers are generally capable of printing a variety of different type sizes and intensities. The computer instructs the printer to select a particular size or density of type by passing an ASCII code to the printer. To instruct an Epson MX-80 printer to the compress print to 132 characters per 8½ inches of page width use CHR$ (15) before sending material to be printed and after a print command. Consult the manual which accompanied your dot matrix printer prior to using any such code.

COMPRINT 912-GO * This graphics printer features 100 dots per inch resolution (horizontally and vertically). Comprint.

COMPRINT 912-Serial * The COMPRINT 912 is a serial electro-graphics computer printer including a 12 x 9 matrix, 225 characters/second, 170 lines/-minute, 80 characters/line, RS-232 and 20ma current loop serial interface, and 256 byte buffer. Comprint.

Compu Cube* Provides study of two views of Rubik's cube developed by a Hungarian architect to teach his students spatial relationships in three dimensions. Some of the things you can do with this cube are mix the cube around with one command, turn the cube or any face in space, and signify complex moves with one command line. 48K. Stoneware, Inc.

Compu-Dikduk* Helps strengthen students' Hebrew grammar. Aspects covered are: conjunctions of Hoveh and Atid in Kal; singular and plural possessive forms; masculine and feminine common nouns; uses of prefixes and suffixes. Graphics aid learning process. Tests and quizzes included. Good for individual study or in a classroom environment. Institute for Computers in Jewish Life.

Compu-Grade: Teacher's Gradebook Programs* Educators can reduce their record keeping and paperwork time with this nine-program package for grading, statistical analysis, and record storage and retrieval. Report cards and various other reports can be generated, and information can be easily updated. Franklin Software.

Compu-Law* Eleven programs designed for attorneys-at-law. It features a complete billing system, status reports, summary shows, bookkeeper, and general ledger. 48K; printer. Compu-Law, Inc.

Compulize System A multi-use farm management package that analyzes and records soil requirements, fertilizer use, and crop yields. It also includes General Ledger, Accounts Recievable, Inventory, and Payroll functions. It will help determine the break-even point in cash crop farming and compare profits for contract crop sales vs. cash. H.C.I.

Compu-Math Arithmetic Skills* Developed to teach elementary students arithmetic skills by allowing them to choose their own area of need. Includes good, but slow, graphics. 48K. Edu-Ware.

Compu-Math I: Fractions* Improve your ability to perform fractional mathematics. Practice problems and graphics display each type of problem in detail to increase your understanding. Text explains

Lowest denominator, common denominator, and more. 48K. Edu-Ware

Compu-Read* Four programs developed to increase reading speed, increase retention of reading material, enable you to build word lists, and increase motivation. For children and adults. 32K. Edu-Ware.

Compuserve* A subscription information service that can be accessed with a modem and password. Services offered include electronic catalog shopping, education, games, Dow Jones updates, entertainment, word processing, and electronic mail. Documentation is not as good as it should be, but help menus are available. Requires a 300-baud modem. Compuserve.

Comp-U-Sky* A hi-res graphics program that will let the user locate, identify, and deliver information about objects in the sky. Any location on earth, as well as overhead, can have directional graphic displays. Scharf Software.

Compu-Start* A program to teach the novice about the Apple II. By the end of the program, the first time user will have learned about the keyboard, disk drives, memory, graphics, simple programming and printers. Compu-Start.

Computer A general purpose computing system incorporating a central processing unit, memory, I/O facilities, power supply, and cabinet.

Computer Aided Instruction for General Chemistry* A twenty-area package of comprehensive study in the major areas of chemistry—well suited for advanced placement courses in high school. Some of the areas covered are units and measures, equations and molality, atomic structure, chemical bonding, gases, Periodic Table, solutions, chemical equilibrium, acids and bases, electrochemistry, organic chemistry, nuclear chemistry, and more. 48K; language card, Applesoft in ROM. John Wiley & Sons, Inc.

Computer Assisted Television Instruction (CATI)* A package to make audio-visual teaching and learning an interactive process. This system is flexible and motivating—lesson materials along with customized color graphics can be used to meet the needs of individual students. Video segments that you specify can be to complement interactive programs. Sample programs are included, and there are several different interface systems from which to choose. The system is designed to interface with the Sony SLO-323* in the Beta format and the Panasonic NV 8200* for the VHS format. Includes connectors, system software, and sample instruction programs. Whitney Educational Services.

Computer Awareness* Designed for grades four to seven, this educational set will teach students about the computer and programming. The set includes four film strips with accompanying audio cassettes, and two program disks filled with items for "hands-on" computer learning. Society for Visual Education, Inc.

Computer Cajun Cuisine* Go New Orleans with this program that calculates amounts needed for the number of servings you want for eight Louisiana soup and gumbo recipes. 16K. Technical Software.

Computer Cases* A case to hold the Apple III, two additional disk drives, and silentype printer. Computer Case Company.

Computer Discovery* A computer literacy course which provides an introduction to computers, computer history and applications, hardware and software concepts, and simple programming. Includes software with accompanying workbook. Science Research Associates, Inc.

Computer Discovery Program* This is a complete school course designed to be used at any grade level from upper elementary to high school. The student is given a wide variety of information ranging from the history of the computer to simple programming and the social ramifications of computing. The course includes a workbook written at two different levels so that students with different reading levels can work together. Note: SRA courseware is not for sale, it is available under license agreement from SRA. Science Research Associates, Inc.

Computer Generated Mathematics Materials Volume I—Problem Solving* A utility package designed for children between third and eighth grade. Choose from a variety of test material to enhance skills in reading graphs, interpreting tables, and other problem-solving areas. 32K; disk and printer. Minnesota Educational Computing Consortium.

Computer Graphing Experiments—Volume 1* Covers Algebra I and II: Linear and Quadratic Functions and Inequalities, Absolute Value, Polynomials, and Exponential and Logarithmic Functions. 32K; DOS 3.3. Addison-Wesley Publishing Company.

Computer Graphing Experiments—Volume 2* Contains Trigonometric Functions: Sine, Cosine, Tangent, Cotangent, Period, Amplitude, Phase Shift, and Polar Coordinates. 32K; DOS 3.3. Addison-Wesley Publishing Company.

Computer Graphing Experiments—Volume 3* Includes Conic Sections: Parabolas, Ellipses, Hyperbolas, General Quadratic Functions, and Inequalities. 32K; DOS 3.3. Addison-Wesley Publishing Company.

Computer Is, A* An educational program designed to teach the student about all aspects of computers. Lessons begin with basic computer definitions and progress through architecture, peripherals, and system design. Tracks a student's progress throught the set, allowing him to recommence where he left off. Junior high level and above. 32K. Micro Power & Light Company.

Computer Lab in Memory and Cognition* Teaches students about concepts of cognitive psychology. Features simulations of some of the famous experiments based on well-known models from scientific literature. Includes ten main programs, a student manual, and an instructor's manual. Conduit.

Computer Laboratory Manual for Number Theory, A* An experimental and inductive approach to learning number theory. This approach gives the students exercise with the interplay between intuition, experiment, and logical proof. Through computer experimentation, the student experiences research. The manual comes with forty-one experiments with explanations. COM Press.

Computer Listener, The* Plug this board into one of the eight expansion slots of your Apple and listen to your computer work away. Every time the computer executes an instruction (or does anything) the Listener hears it and converts it into a pulse. The pulse is then sent through an amplifier to the internal speaker of the computer. This unique function could prove useful when you are trying to debug a program and get stuck. Listen in on the computer, and with luck, you can hear where your problem is. This is also a very useful tool in learning about computers. In fact, the applications available are endless. M & R Engineering.

Computer Literacy* Written by Waren Jones, Bobbie Jones, Kevin Bowyer, and Mel Ray. This text may be used for individual study, as a classroom text, or in a computer camp. The chapters alternate between general information and specific programming exercises. Each begins with a set of objectives and ends with review problems and questions, and a list of further readings. One unique chapter is "Programming as a Team Activity" which promotes communication and cooperation among class members instead of each student working in isolation. Using this book while working with the computer is definitely encouraged. Reston Publishing Co.

Computer Literacy Instructional Program (CLIP) *Designed for educators who need a thorough base in computer literacy. This is a self paced program with coverage of languages, the keyboard, calculating on the computer, classroom instruction using a micro, software selection, and computer facility management. Educational Activities, Inc.

Computer Math Games, Volume 1* A package of games offering practice using math for grades one through nine. Addition, subtraction, division, and multiplication, using whole numbers, fractions, decimals and integers; practice with equivalent fractions, improper fractions, or mixed numbers; practice using percents. 32K. Addison-Wesley Publishing Company.

Computer Math Games, Volume 2* A package of these five games for grades one through nine: *Your Number's Up*—place values of whole numbers or decimals. *Math Basketball*—timed addition, multiplication, division, subtraction exercises. *Match Up*—addition, multiplication, division and subtraction exercises with whole numbers. *Tic-Tac-Math*—addition, multiplication, subtraction and division using whole numbers, decimals or integers. *Horse Race*—addition, multiplication, division, subtraction timed exercises. 32K. Addison-Wesley Publishing Company.

Computer Math Games, Volume 3* A package of seven games: *War*—recognition, counting, comparing whole numbers zero through thirteen (grades one through three). *Flash*—addition, subtraction, division and multiplication (grades one through nine). *Square It*—finding the square of one or two digit sums or differences (grades six through nine). *Reduce*—timed practice with fraction reduction (grades four through nine) *In Between*—the "notion of betweeness" and practice counting (grades two through four). *Twenty-One*—practice formulating a strategy and missing addends (grades two through nine). *Zero*—finding the sum of integers (grades six through nine). Addison-Wesley Publishing Company.

Computer Math Games, Volume 4* A package of five math games: *NIM 25*—counting to 25 and formulating a strategy (grades three through nine). *Math Darts*—Timed addition, subtraction, multiplication, and division of numbers zero through one hundred (grades one through nine). *Five Hundred*—timed compact notation, expanded numbers, or place-value identification (grades two through nine). *Woodchuck*—addition, subtraction, multiplication or division of numbers zero through 255. *Cover Up*—addition or subtraction of numbers zero through one hundred. 32K. Addison-Wesley Publishing Company.

Computer Math Games, Volume 5* Vocabulary practice with math or computers (grades four through nine). 32K. Addison-Wesley Publishing Company.

Computer Memory Storage in Bytes. The capacity of the random access memory of a computer is defined in terms of bytes. A byte is a label for storage required to hold one character (letter, number, or symbol) in RAM or on a diskette. The Apple II and Apple II+ computers were built with a maximum memory of 48K (49,152) bytes in RAM. Originally, both computers could be provided with an additional 16K of RAM by plugging in a language card or similar memory expansion card. Recently, plug-in cards have given these computers the ability to expand 128K and 256K in addition to the on-board RAM.

The Apple IIe computer is sold with 64K (65536) bytes of RAM. It can be expanded to 128K by adding a plug-in memory expansion card.

The Apple III computer was originally equipped with a minimum of 96K (98,304) bytes of RAM and a maximum of 128K (131,702) bytes of RAM. The 128K configuration is now standard.

Computer Models For Management Science* Developed by some of the most informed management science teachers and users, this tutorial will help the user understand managerial principles. There are a number of chapters covering management science, decision science, and operations research. Within the chapters are sample programs covéring different topics and problems. Through working with sample problems and inputted data, the person will become more familiar with the processes used in real business situations. DOS 3.3. Addison-Wesley Publishing Company.

Computer Palette* Create shapes and figures with this picture management system. A variety of sixteen colors are available for use. Edutech Corp.

Computer Portrait Subsystem* A system that allows you to create portraits that can be transferred to T-shirts and other novelty items. Includes the Dithertizer II with video camera for input, portrait software, Station Master printer interface card with cable, and the starter supply. 48K. Requires game paddles, monitor, Epson MX-80 printer* with graphics option, or Centronics printer*. Computer Stations, Inc.

Computer Programmed Accountant, The (CPA 1) General Ledger* An accounting tool that provides double entry bookkeeping, concise audit trails, and useful financial reports. It includes a hi-res plotting function to aid in keeping track of specific accounts. 48K; ROM Applesoft, DOS 3.3; two disk drives; and printer. Continental Software.

Computer Programmed Accountant, The (CPA 2) Accounts Receivable* Print invoices on plain paper or custom forms available for this accounting aid. It will keep track of back orders and extensions, and issue customer statements. Aging reports are generated, as well as customer lists and labels. 48K; Applesoft; DOS 3.3; two disk drives; and printer. Continental Software.

Computer Programmed Accountant, The (CPA 3) Accounts Payable* Generate checks for vendors along with a check register that shows invoices paid, discounts, and net amount paid. You can print various reports, vendor lists and labels. 48K; Applesoft; DOS 3.3; two disk drives; and printer. Continental Software.

Computer Programmed Accountant, The (CPA 4) Payroll* A personnel record and payroll system for up to 100 employees. This program prints checks, W-2s, State of California DE-3 information and more. It generates the Payroll Journal and posts to the General Ledger. 48K; ROM Applesoft; DOS 3.3; two disk drives; and printer. Continental Software.

Computer Programming* A visual and audio course in BASIC. Course covers thirty-three programs in teaching the user to program in BASIC. Designed for students in junior high and above. Educational Teaching Aids.

Computer Security Lock* With this package, consisting of hardware and software, you can lock your computer so no one else can use it (unless they have the password). If someone without the correct password tries to use your computer, it will automatically shut down and nothing—except the correct password—will break the lock. Word-Power.

Computer System A complete system including the MPU, keyboard, CRT, and other peripherals such as printers, disks, tapes, etc. The term is often used to include programs.

Computer Underteacher* A program of particular interest to advanced math and computer science classes, it transposes the keyboard to include the capacity of 3-D vector analysis. 48K. Frank Salvage.

Computerized Career Information System* After completion of a career-oriented test, students will discover where their career interests lie. A listing of 240 job titles and descriptions are available for students to obtain more information. Includes an instruction manual. 48K. Random House School Division.

Computerized Farm Accounting System (CFAS)* Manage your taxes and maintain the records needed to make enterprise management decisions. This program is even for the computer novice. Up to nine thousand transaction records can be maintained over a yearly period, subcategorized in 105 predetermined income and expense categories. The user can forecast a budget and then compare it to actual expenses, while generating cash flow records. Total sums for all income and expense categories are available on demand in a Net Farm Income Statement. You can also use the program to forecast your upcoming taxes. AG-COM.

Computerized Farm Records* This software is specifically designed to provide management information for farmers. It maintains a double entry, running cash balance as well as specific information and a budgeted amount for every user-defined item constituting an asset, capital outlay, liability, or expense. Checking account and non-cash transactions are both recorded and the program generates year- or month-to-date expense and income records. The entire package is menu-driven. A printer is required. Micro Learningware.

Computerized Stock Market Analysis* Creates On-Balance Volume Charts and is designed for the novice computer user, featuring non-technical language. Printer suppport is recommended for using this one. Stock Market Software, Inc.

Computers in the Biology Curriculum* A progressive work study for biology students. Seven programs are included to help teach fundamentals in such areas as genetics and ecology. An instruction manual is supplied. Conduit.

Computing Investor, The* A package of programs aimed at helping the stock analyst predict future trends. Some of the features include QuotePro—a base for daily or weekly quotes, ChartPro—generates price-volume charts, QuikFolio—evaluation of sample portfolio, FotoFolio—shows you the status of your portfolio, Momentum-M—plots equity momentum, and Transactor—stock account manager. All information and graphs have "what if" capability to vary input to see its reaction on the final results. Microcomputing Reseach.

Compu-Trac* Offers the user an opportunity to link up with a group of financial traders in New Orleans, via modem, and gather all the latest stock information on a daily basis. 48K; Superchip; printer; parallel card; and modem. Compu-Trac, Inc.

Compuvision* A tool for retailers that will run pre-recorded video messages on various computer software. Includes a stand-up console, VHS tape deck, monitor and interface board. Compuvision.

CON CON is an Integer BASIC command which can only be used in the immediate mode (a command given directly to the computer rather than from within a program statement). This command instructs the computer to resume operation of a program which was interrupted by a CTRL-C. It will sometimes restart the program after RESET has been pressed. If the program was interrupted while executing an INPUT statement, it cannot be restarted. CON will sometimes work if you've added new program lines or if an error message has been printed on the screen. If CON is used to restart a program which has not been interrupted, the system will lock up and you will have to restart the computer. In those instances described above, when CON works, it resumes operation of the program at the next instruction after the line where the interruption occurred.

CON: Reserved Device Name to CP/M DOS. Stands for console, keyboard or screen.

Concatenation Of data (or programs). Adding one item on at the end of the others to produce one longer data or program item.

Concatenation In CP/M it is possible to link a number of smaller text files together into one big file through a concatenation command, provided there is enough space on the storage disk to accept a file of the size generated. The PIP command is used to join together two files or several files. PIP can also be used to join non-text files and hexadecimal data files. See PIP.

Concatenation of Strings Applesoft BASIC and Integer BASIC allow the user to add one string to the end of another. In Integer BASIC strings must be dimensioned with a DIM command. Concatenation will not work unless the first string variable has enough allocated space to accomodate both strings. Applesoft BASIC allows concatenation without dimensioning. An example of concatenation in both languages follows:

INTEGER BASIC

```
5 DIM F$ (40), L$ (20)
```

```
10 INPUT “INPUT YOUR FIRST NAME:” F$
20 INPUT “INPUT YOUR LAST NAME:” L$
25 F$ (LEN(F$)+1) = L$
30 PRINT F$
35 END
```

APPLESOFT BASIC

```
10 INPUT “INPUT YOUR FIRST NAME:”; F$
20 INPUT “INPUT YOUR LAST NAME:”; L$
30 F$ + “ “ + L$
35 PRINT
40 PRINT N$
45 END
```

Concentrated Chemical Concepts* A very complete coverage, drill, and practice for introductory courses in general, organic, and biological chemistry for college health science majors. Suitable for advanced placement courses in high school. 48K; DOS 3.3; Applesoft or language card. John Wiley & Sons, Inc.

Conditional Branching If a branch to another program line or to a subroutine depends upon a specified condition being met such as equality, inequality, being greater than or less than, etc., the branch which is executed is considered a conditional branch. For example:

```
25 If A = 12 GOTO 195
```

Thus, if the variable A equals 12, the program will flow to line 195 and execute that line.

Conduit* An educational tool designed to instruct students in the various methods of descriptive statistics. Included are discussions of the methods used, such as frequency distributions and sample means. Students using this program should have high school algebra, and some familiarity with summation notation. No programming experience is needed, though an option is included that offers programming exercises. A useful manual is included, as well as sample data sets. Conduit.

Configuration Block Apple III device drivers rely on a configuration block for operation. This is a table of default values, some of which create no change in parameters although the user may change them. The RS-232 driver relies on such a table to specify protocol. The printer driver also relies on such a parameter table to control data transfer rate, line feed delay, and to specify a form feed character which may differ from printer to printer.

Configuration Block Parameters The Apple III system Configuration Program makes use of a configuration block to properly identify the slot location of any peripherals controlled by a particular driver. It also provides for a unit number for the peripheral, a manufacturer ID for the peripheral, a block count, and a version ID. The parameters contained in the Configuration Block data section of this program may be changed by selecting item 6 on the System Configuration Program screen. Such changes should only be made by experienced users after reading the Apple III Standard Device Driver Manual and the manual for the particular peripheral being connected to the Apple III.

Configuration Menu Apple III SOS uses a configuration menu on the utilities diskette for the user to review and change system configuration on boot diskettes. This configuration menu offers the user the following choices:

R—Read a Driver File
D—Delete a Driver
E—Edit Driver Parameters
C—Change System Parameters
G—Generate a New System
Q—Exit to Main Menu

This menu makes the reconfiguration facilities of SOS available to the user.

Configuring Boot Diskettes Apple III SOS requires data diskettes which are to be loaded directly into the system, instead of being accessed from the already running system, to be configured with SOS. This configuration process allows the computer to recognize all of the features of the user's system. The configuration is accomplished by using the System. Configuration Program on the utilities diskette. This program should be used to set up the required device drivers and to set system parameters for the particular configuration of the user's system. Some examples of drivers which might be included in a typical system are the console driver, a printer driver, and a graphics driver. The number of disk drives in use is a typical parameter which might be changed. Once the new configuration has been established, a new system must be generated by the configuration program and stored on the disk which contains the boot routine.

Conjob* Project costs and budget money, time, and materials for construction jobs. A running account in user defined parts and phases can be kept for comparison during the project. Computerized Construction Management Systems.

Connectors Connectors on any computer are the means by which the computer's circuits are connected to devices which accept data and commands from the computer or provide data or commands to the computer. Connectors are generally some type of plug, socket, or slot within or outside of the computer case.

CONNECTOR	APPLE II/APPLE II+	APPLE IIe	APPLE III
Cassette Jack Sockets	Yes	Yes	No
Monitor Jack Sockets	Yes	Yes	Yes
TV Set Connector (inside)*	Yes	Yes	No
Game Control Connector (inside)	Yes	Yes	No
Power Cord Socket	Yes	Yes	Yes
8 Expansion Slots (50 Pin)	Yes	No	No
9 Pin Hand Control Connector (outside)	No	Yes	No
60 Pin Auxiliary Slot	No	Yes	No
7 Expansion Slots (50 Pin)	No	Yes	No
Keyboard Input Connector	Yes	Yes	Yes
Speaker Connector (inside)	Yes	Yes	Yes
9 Pin Joystick Ports (2 each)	No	No	Yes
RS-232C Serial Interface Port	No	No	Yes
Color Video Port (15 Pin)	No	No	Yes
B/W Video Port	No	No	Yes
Audio Output Jack	No	No	Yes
4 Expansion Slots (50 Pin)	No	No	Yes

* Note TV Set Connector requires the use of a RF-Modulator to convert the computer's signals to signals which a TV set can interpret.

Connectors, Peripheral The Apple II and Apple II+ computers are equipped with eight internal 50-pin slots which allow RAM memory expansion, video display expansion, and connection to such peripherals as disk drives, printers, input/output devices, modems, typewriters, robots, and other computers. The Apple IIe computer is equipped with seven such slots and one 60-pin auxiliary slot. The latter is intended for 64K of memory expansion, 80-column video display expansion, or combined 64K memory/80-column video display expansion. The Apple III computer is equipped with four slots for system expansion.

Con*putation* Includes two memory building programs. One is a concentration-type game for up to two players with eight levels of math learning. The other is Tonal Encounter, in which the child plays back the computer-composed musical selection. Features sound and color. 48K ROM or language card; DOS 3.2 or 3.3. T.H.E.S.I.S.

Conservation* Includes four lessons: the first is about limited and unlimited resources and the concept of conservation; the second is about the environment as a habitat for other animals, the balance of nature, and the concept of extinction; the third is about the soil, erosion, and farming methods used for soil conservation; and the fourth is about water, watersheds, irrigation, dams, and water pollution. 48K. BLS, Inc.

Conservation Laws* A fourth volume in the physics series designed to supplement course lectures for college freshman. Conservation concepts for momentum and energy are discussed through the means of definition, illustrative examples, and math solutions to sample problems. Abundant examples of elastic and inelastic collisions are included. Conservation of angular momentum is illustrated. Also shown: how a bouncing ball's potential energy is transformed into kinetic energy as it falls, and back into potential energy after it bounces. How friction loses energy is also discussed. 48K. Cross Educational Software.

Console The terminal that has the most control in a system. On a microcomputer, the keyboard or the front panel is the console. This term is used most frequently in CP/M. It is also used in connection with the Apple III and SOS.

Console Command Processor CP/M utilizes a portion of RAM to store the major portions of the operating system. The components stored in RAM are BIOS, a bootstrap loading routine, BDOS, TPA, and CCP. CCP stands for Command Control Processor. This portion of the Operating System displays the CP/M system prompt on the screen. This prompt also indicates the active disk drive (A> or B>). The CCP then waits for a command from the user. When the processor receives what it recognizes as a built-in command, it executes it immediately. If it receives a command which is not built-in, it assumes it is a Transient Program on disk and loads it into the computer's Transient Program Area (TPA). It then converts the instructions contained in this program to a file control block which allows the computer to access and execute the transient program as if it where a built-in command. Once the file control block is created, the Transient Program is erased from memory and execution is accomplished from disk by using the file control block and BDOS.

Console Control Keys See Control 5, 6, 7, 8, 9.

Console Device The Apple III term for the combined keyboard and video display is "console device." This term and "console" are used in Apple III manuals to describe the primary avenue of communication between the computer and the user.

Console Driver The Apple III console driver establishes the manner in which communications from the keyboard and video display will be carried out.

Constant An explicit value rather than a symbolic value in a program instruction or statement. The value is fixed throughout a program.

Construction Accounting System* An accounting program for the general contractor or subcontractor. Features a subsystem for subcontract management, a general ledger system, a project management system, a payroll system, and a document processor for proposals and bids. Disk; requires Applesoft and a 132-column printer. Charles Mann & Associates.

Construction Bookkeeper* Computerize your construction business with this package that provides project management, job costing, general ledger, payroll, and subcontractor control systems. It generates a variety of useful reports on a per job basis, as well as general financial statements and reports. Applesoft; 130-column printer. Monument Computer Service.

Construction Cost/Profit Analysis* Helps builders make decisions about building project profits. Some factors considered are: interest rates, legal fees, building costs, land draw, land costs and financing projects. Also features the return on investment and total dollar profit. Possible projects can be analyzed by changing the amounts of building costs, land cost, interest expense, and other construction cost data. You can also compare different construction on the same site or similar construction on different sites. Realty Software.

Construction Material List Generator* Gain faster estimates for residential and small commercial construction jobs. The program will gather, calculate, and list inputed materials needed by the contractor. You can access totals after calculations have been made. Convert the measurements on the blueprints to material order forms fast and easily. Computerized Construction Management Systems.

Consumer Drug Watcher* A two-program package which gives information on and tests medication. Make the correct decision as you choose from over 550 over-the-counter and prescription drugs. 48K. Medical Watch Software.

CONT BASIC Statement. Causes program execution to resume after a CTRL-C has been pressed, a STOP or END statement has been executed in the program, or an error has occurred. The format is:

```
CONT
```

Execution of the program will continue at the point where the break occurred. If it occurred following a prompt from an INPUT statement, execution will continue with the reprinting of the prompt.

It is useful in conjunction with STOP for debugging. When execution is stopped, you can examine or change the values of variables using direct mode statements. You may then use CONT to resume execution, or use a direct mode GOTO, which resumes execution at a particular line number.

CONT is invalid if the program has been edited during the break. The CONT command is not implemented on the BASIC compiler. This command is available in Applesoft BASIC and in Apple III Business BASIC.

Contando* Introduction to counting and number recognition in Spanish. Equivalent of Counting* (q.v.). 32K. NTS Software.

Control Bus The set of control lines (in a computer system) to carry the necessary synchronization and control information throughout the system. Examples of signals carried on these lines are orders such as READ or WRITE, and sync signals such as Interrupt, Hold, or Acknowledge.

Control Characters The CTRL (ConTRoL) key is used in combination with other keys on the Apple keyboard to give those keys used with the control key added functions. In programs, specific ASCII codes used with CHR$ serve the same purpose. A table of control characters and their functions are listed below.

CONTROL FUNCTION	COMPUTER USING FUNCTION	MEANING
CTRL-A		
CTRL-B	II, II+, IIe	Leave monitor & reenter BASIC.
CTRL-C	II, II+, IIe	Stop current program; restart current program.
CTRL-D		
CTRL-E	II, II+, IIe	Display register contents.
CTRL-F		
CTRL-G	II, II+, IIe	Sound bell.
CTRL-H	II, II+, IIe, III	Delete a single character; Print a null character.
CTRL-I		
CTRL-J	II, II+, IIe	Line feed.
CTRL-K	IIe, II, II+	Directs computer to accept keyboard input; boot DOS from monitor.
CTRL-L	IIe	Clears screen and homes cursor.
CTRL-M	II, II+, IIe, III	Return character.
CTRL-N	II, II+, IIe	Sets display to normal.
CTRL-O	II, II+, IIe	Sets display to inverse.
CTRL-P	II, II+, IIe	Direct output to printer slot; Boot DOS from monitor.
CTRL-Q	IIe	Set 40 column display.
CTRL-R	IIe	Set 80 column display.
CTRL-S	II, II+	Freeze program listing on screen.
CTRL-T		
CTRL-U	IIe	Deactivate 80 col—clear screen.
CTRL-V	IIe	Scroll display down one line.
CTRL-W	IIe	Scroll display up one line.
CTRL-X	II, II+, III	Cancel current line from memory.
CTRL-Y	II, II+, IIe	Move cursor to upperleft—no screen clear; employ user defineable command.
CTRL-Z	IIe	Clear line cursor is on.
CTRL-@	II, II+	Returns null character.
CTRL-RESET	II+, IIe	Puts computer in normal operating mode; Reset with safeguard.
CTRL-OPEN APPLE-RESET	IIe	Stops program unconditionally.
CTRL-SOLID APPLE-RESET	IIe	Performs diagnostic tests.
CTRL-RETURN	III	Moves cursor to previous edit field.
CTRL-0	III	Clears buffer & closes graphics driver file.
CTRL-]	IIe	Clearline from cursor to right edge.
CTRL-—	IIe	Move cursor to X, Y position.

Control Characters (CP/M)

CHARACTER	FUNCTION
CONTROL-C	Perform warm start.
CONTROL-E	Move to next line.
CONTROL-H	Back up cursor one character.
CONTROL-I	Tab.
CONTROL-J	Line feed.
CONTROL-M	Carriage return.
CONTROL-P	Turn on printer/Turn off printer.
CONTROL-R	Repeat current line.
CONTROL-S	Freeze screen display.
CONTROL-U	Cancel line—Space down one line.
CONTROL-X	Cancel line—Restart same line.

Control Keys Most of the control keys are defined by the currently executing program, rather than by the Apple's hardware. The same key may produce one function in DOS, another in BASIC, and still another in an applications program such as a word processor.

Control Reset Apple computers with RESET key locking switches require that the CTRL key be pressed along with the RESET to restart the system. This feature is available on the newer models of the Apple II+. The Apple IIe uses CTRL/RESET to stop a program. Open Apple CTRL/RESET is used to restart the system on the Apple IIe computer. The Apple III uses the CTRL/RESET combination in the same way as the Apple II+.

Control Return The Apple III computer recognizes the combination of the CTRL key and the RETURN key as a command to move the cursor back to the previous screen field.

Control System Designer* A two program package for the design of single input, single output control systems described by transfer functions. The first program is for designing compensators, the second is a root locus program for evaluating designs. Data can be saved and retrieved. 48K with ROM Applesoft; 64K with RAM Applesoft; printer is useful. Smart Ware.

Control Unit The module which fetches and decodes instructions. The CU requires an instruction register and a program counter. It generates control signals and manages the control bus.

Control 5,6,7,8,9 Apple III Business BASIC utilizes a numbr of keys from the numeric keypad along with the control key to access special functions. The functions of each of these combinations is listed below:

Combination	Function
CTRL-5	Turns Video Display on and off.
CTRL-6	Deletes contents of type ahead buffer.
CTRL-7	Stops and starts program listings and freezes any screen output.
CTRL-8	Turns response to these screen control characters on or off.
CTRL-9	Instructs computer to ignore characters on screen & allows program to continue without any screen display until toggled back on.

These control key combinations are called console control keys on the Apple III computer. They are available to the general system user as well as the Apple III Business BASIC user.

Controller A circuit board or boards that interface a peripheral to the computer. Complex circuitry maintains device control.

Controller, The* A package for small businesses. It offers efficient handling of General Ledger, Accounts Receivable, and Accounts Payable. Apple Computer, Inc.

Controller, The* A complete financial system for the small business that features Accounts Payable, General Ledger, and Accounts Receivable; also prints reports. 48K. Requires a printer. Dakin5 Corporation.

Controllers, Game Devices which convert circular movement of a pontentiometer to higher or lower voltage. This is communicated to the computer and causes a pointer or game character to move across the screen horizontally or verticallly. These devices are connected to the Apple II, Apple II+, and Apple IIe computer via a game input/output socket on the computer's main board.

CONV CONV is an Apple III Business BASIC command which instructs the computer to evaluate the arguments in a given program line and to return a real number as the result.

**CONV$** CONV$ is an Apple III Business BASIC command which instructs the computer to evaluate the arguments in a given program line and to return the result as a string value.

CONV% CONV% is an Apple III Business BASIC command used in a program line to instruct the computer to evaluate the arguments in a given program line and return the result as an integer.

CONV& CONV& is an Apple III Business BASIC command which instructs the computer to evaluate the arguments on a particular program line and to return the result as a long integer number.

Convert Change from one form to another.

Coordinates On the computer screen, coordinates are the relative X (horizontal) and Y (vertical) positions of the cursor or a plotted point. Coordinates are at the point where the horizontal and vertical lines cross. There are 40 horizontal columns and 48 vertical rows on the Apple II and Apple II+ in low-resolution.

Coordinates—Hi-Res There are 192 vertical columns and 280 horizontal rows on the high-resolution screen of the Apple II+ computer. Applesoft BASIC is required to access this screen with built-in commands. As in the low-resolution screen, the vertical lines establish horizontal position. They are numbered from 0 to 191 with 0 on the left. The horizontal lines establish vertical position and are numbered from 0 to 279 with 0 at the top. The center of this screen is at X = 96 and Y = 139.

Coordinates—Lo-Res There are 48 horizontal rows and 39 vertical columns on the Apple II and Apple II+ low-resolution graphics screen. The vertical lines establish horizontal position and are numbered from 0 to 39 with 0 on the left. The horizontal lines establish vertical position and are numbered from 0 to 47 with 0 on the top. The center of this graphics screen lies at the coordinates X = 19 Y = 24.

Copy—Used to Backup Diskettes. Because diskettes can be rendered unreadable by physical damage, magnetic contamination, or dirt, it is wise to keep at least two copies of any important information.

Use COPY, a CP/M utility to copy selected files to a backup diskette, or DISKCOPY for a faster copy of the entire diskette. COPY (possibly with *.* file name to get all files) has the advantage of reorganizing fragmented files. The disadvantage is slower execution and the necessity of using pre-formatted diskettes. See File Management.

Copy a Diskette—Use of DISKCOPY A CP/M DOS Command to make an exact backup copy of a diskette. DISKCOPY is on the diskette as DISKCOPY.COM and loaded by DOS when needed. The copy is done sector by sector, so that fragmented files are not reorganized. The format is:

```
DISKCOPY <from drive> <to drive>
```

If both drive specifications are omitted, a single drive copy is performed on the default drive. The /1 option (at the end of the command) allows copying of only the first side of the diskette,even if the drive is double-sided. DISKCOPY will copy onto an unformatted diskette, formatting the diskette as part of the copy procedure. See DISKCOPY for a list of all messages shown while using DISKCOPY.

Copy Another (Y/N)? CP/M message when using DISKCOPY. If you want to copy another entire diskette press Y; if not press N. If Y is pressed, prompts will be provided by DISKCOPY.

Copy Complete CP/M message when using DISKCOPY. The target diskette now has an exact copy the source diskette.

Copy Cruiser* Format disks in large numbers, production style. It only takes seconds to format a 35-track diskette or a 16-sector format with DOS, PILOT, Pascal, CP/M or SOS. Many handy features are included to save time, energy, and wear on equipment. 128K. Phoenix Software, Inc.

Copy File Command. Apple III SOS users can copy files from one disk to another using Copy Files, a selection on the File Handling Command Menu of the utilities diskette that comes with the system. This command is selected from the menu and runs a self-prompting program.

Copy System* Provided as a hardware/software package, this system allows you to copy both thirteen- and sixteen-sector disks. The hardware is easily attached to your Apple and will not affect normal operation of the computer. ALF Products, Inc.

Copy Volume Command. Apple III SOS users can copy the entire contents of a diskette (volume) by using the "Copy One Volume Onto Another" selection from the Device Handling Menu available on the utilities diskette that comes with the system. This is a self-promoting program.

Copycat* A utility program designed for graphic display of characters. Features the ability to save on a second disk. 48K. California School for the Deaf.

Copying a Disk There are a number of methods available with Apple computers to copy the contents of one entire disk to another disk. The Apple DOS 3.3 Systems Master Diskette provides COPY and COPYA, two programs which allow the user to copy unprotected data. The Apple III computer comes with a utilities diskette that provides several filing utilities. The Copy Volume command allows copying of the contents of one disk to another. This command is accessed by selecting option "D" on the menu. This option stands for disk handling commands.

The CP/M operating system used by the Apple computer contains two disk copying utilities. These are DISKCOPY and PIP. Some CP/M operating systems provide copying utilities with other names. DISKCOPY allows the user to format a blank disk, transfer system tracks, or copy the contents of an entire diskette. Two disk drives are required to copy CP/M files.

Copying a File The Apple DOS 3.3 System Master contains a Machine language program called FID (FIle Developer) which allows the user to catalog a diskette, reset slot and drive, lock files, unlock files, verify files, delete files, find free space on diskette, and copy files from one diskette to another. This program runs on one disk drive or two disk drives. Once mastered, it is extremely versatile and can be conveniently used to classify programs on a single disk according to type, etc. All of the routines in this program are self prompting and easy to use.

The Apple III Sophisticated Operating System uses a program on the utilities diskette provided with SOS. Copying can be accomplished with one or two disk drives. The COPY FILES command is used to copy individual files from one volume (disk) to another.

In CP/M the most common utility for copying individual files is PIP. This command or transient program can copy specific files or types of files from on diskette to another. For example, if you enter:

```
PIP A: = B; *.*
```

PIP would copy all of the files from the diskette in drive B onto the diskette in drive A. A program called WASH provides a menu driven file copy utility in CP/M.

Copying System Tracks Apple DOS 3.3, Apple III SOS, and CP/M all provide the ability to make a diskette self-booting from a cold start by allowing the transfer of system tracks to a formatted diskette. All three systems give the user the option of making diskettes "slaves" or "masters." To boot a "slave," you must first have loaded the Disk Operating System, Sophisticated Operating System, or CP/M into your computer. A "master" contains an "image" of the operating system which allows the user to boot the diskette even though the operating system has not been loaded into his computer.

Apple DOS 3.3 uses a program called Master Create which is included on the System Master Diskette to attach the DOS image to the HELLO program of any DOS 3.3 formatted diskette. Apple III's SOS requires three files on disk before it will boot automatically. These files are SOS.Kernal, SOS.Interp, and SOS.-Driver.

Core A small magnetic torus (or doughnut) of ferrite used to store a bit of information. Cores can be strung on wires so that memory organizations of 32K 18-bit words can be packed into space with dimensions ½ by 6 by 6. One advantage of core is that it is non-volatile. Also, as a holdover from the days when nearly all computer internal memory was core, the word is still sometimes used as a synonym for internal memory: core-image, in core, etc.

Co-Resident Assembler* A two-pass Assembler with a text editor that can save and load text files from magnetic tape. Cassette or disk. Computer Components, Inc.

Corn Harvest Losses* A companion program to Profitable Corn Harvesting, this program is designed to help the farmer determine the extent and the cause of corn harvest losses. AG-COM.

Corn vs. an Alternate Crop* This program compares the economics of raising corn or soybeans or another grain crop. Assuming certain fixed production costs are the same for both crops, the program will calculate the market price neccesary to make growing that crop profitable, despite any special costs perculiar to that crop. AG-COM.

C.O.R.P. Program Generator* The Combined Operating Re-entrant Programming (C.O.R.P.) is a source code program generator in Applesoft BASIC. Data Entry and Print programs can be created by users with no knowledge of programming. The generated programs are modifiable for a variety of uses. The user enters simple commands for the parameters of the data entry program and C.O.R.P. generates a corresponding print program. Disk. Macromaty.

Corporation Feasibility Study* Shows comparison of taxation, insurance, and investment costs for an incorporation plan vs. the present investment plan. RE/International Systems Corporation.

Correspondent, The* This is a text editor, not a true word processor, although it may be used as such. You are limited to a 40-column screen, without the capability of seeing on the screen what will appear on the printed copy. The documentation is printed, but following the directions only gives you the choice of editing a necessary program for your library. Southwestern Data Systems.

Corvus Mirror* This system is designed to provide low cost backup of Corvus and other hard disk systems. By using normal video cassette tape and a video cassette recorder, this system can store about 1 million bytes of data per minute on tape. A standard tape will hold about 100 million bytes of data. The system interface provides the necessary transformations of data from hard disk to the VCR. Corvus Systems.

Corvus Multiplexer* Interconnects as many as sixty-four personal computers in an interactive multi-user network. With the Multiplexer, each computer will have high-speed access (60,000 bytes per second) to up to eighty million bytes of hard disk capacity. In addition to being multiuser, this system is multifunctional and can be used not only for word processing but also for inventory control, financial planning and accounting. Technically, the Multiplexer is a network in which computers are connected in a starlike configuration. Using a Zilog Z80 microprocessor, the multiplexer lets each computer access the disk system as if were the only one attached. Also, each computer system can use its own operating system without modification. Corvus Systems.

Corvus Winchester Disk System* The Corvus System includes a 6, 11, and 20 mb Winchester disk. The system expands the data storage capacity of the IBM PC and at the same time offers the field-proven reliability of Winchester disk storage. Included are an interface card and cable, documentation, and software. Inexpensive backup is available with the Corvus Mirror video tape backup and archival system. Corvus System, Inc.

COS—BASIC Function. COS returns the trigonometric cosine function of <x>. The format is:

<variable> = COS(<x>)

<x> is the angle whose cosine is to be calculated. The value of <x> must be in radians. To convert degrees to radians, multiply the degrees by $\pi/180$ where $\pi=3.141593$. The calculation of COS(<x>) is performed in single precision.

Cosmobiological Dial Printer* This plastic dial will overlay most of the plastic wheels currently used to print complete dials from 90 to 360 degrees. Compatible with some Epson and Paper Tiger printers. Matrix Software.

Cost Accountant* An aid to the busy professional who manages up to 200 jobs simultaneously. This system has a payroll function that generates reports to meet most government requirements, and a management report generator for financial statements and job information. 48K; Applesoft; 130-column printer. Monument Computer Service.

Count, The (A Winning Blackjack System)* Learn to play blackjack by means of a count card system that will give you the competitive edge! This system has been shown to give an even standoff with the casino because it maximizes the player's chances. You will learn the proper way to bet, and you can even dispel improper card play. You can also alter certain game conditions like double downs, pair splits and insurance rules. Comes with charts and instruction sheets to clarify your understanding of the game and the system. 48K. Pear Software.

Count and Add* Grades kindergarten through second can gain immediate feedback in counting. Graphics and various levels of difficulty are also included in this addition program. Disk or cassette. Steketee Educational Software.

Counters Assembly language programmers use counters within the status register to accomplish program loops. This register holds a single byte of data. This byte may have a value between 0 and 255 ($00 to $FF) on the Apple computer. To define the number of loops to be made, the X register or Y register may be set to a particular value and then decremented (reduced) or incremented (increased) until a value of zero appears in the register. Thus counters in this sense are binary counters.

Counting* Counting and number recognition. The student presses a number to indicate how many figures are in a box. Correct recognition results in a happy face. 32K. NTS Software.

Counting Bee* A learning package that deals with math, weight, measurement, counting, and shapes. 48K; DOS 3.2 or 3.3. Edu-Ware.

Counting Programs* A four-program package designed to help preschool through second grade students master the 1, 2, 3s. Counting to 101 and multiplying low figure numbers are colorfully animated to fun songs. 16K. Edutech Corp.

Country Combo* Using a puzzle format, you can create hundreds of pictures on the computer screen. Take each hi-res piece and determine its correct position to make sky, trees, fences, people, and almost any other object you can imagine. Recommended for all ages. 48K. Micro Power & Light Company.

Course History System* Designed for use with the SASI BASIC Applications System, this program handles student records of courses completed and status of progress toward graduation. Information can be accessed by either screen display or printer. If one addition is made to a student's records, all related records are automatically updated, i.e., new grade point average is calculated, graduation status is updated, etc. Transcripts can be produced, as well as other listings of student records and requirements, with this seven-program system. Educational Timesharing Systems, Inc.

Course Outline* A course outline for an Applesoft BASIC class which lasts for eleven weeks, averaging three hours of class per week. When used in conjunction with Assignment Set, the course will give good coverage of BASIC and microcomputers. Topics range from BASIC arrays to disk boots. A good guide for the first time teachers. DOS 3.2 or 3.3 Indian Head Software.

COUT The standard output subroutine in the Apple's ROM is called COUT. This subroutine causes letters, numbers, and symbols to be displayed on the monitor screen in normal or inverse mode. Although letters, numbers, and symbols are displayed by COUT, most control characters are not recognized by COUT. The only control characters to which COUT responds are RETURN, CTRL-G (bell), line feed, and backspace. Each time the computer accesses COUT, the specified character is displayed on screen at the current cursor position. This cursor is not visible. When COUT receives a RETURN, this cursor is moved down one line and to the left edge of the screen. If the cursor rests on the bottom line of the screen at this time, all lines scroll up one line. This subroutine enables the computer to communicate with the user by displaying its standard character set on screen.

Cow Calf Profitability* Calculates the profitability of each production cycle for cow-calf operations. AG-COM.

CPAPartner* Designed for billing and client write-up purposes. Accountants can record expenses, revenue analysis, balance sheets, and much more for up to 500 clients. Reports include invoices, billing statements, special footnotes, and client information. Software Dimensions, Inc.

CP/M CP/M is an acronym for Control Program for Micropocessors, an operating system. It provides a structure which enables the user to employ the hardware (circuitry) of a computer and to effectively employ any peripherals attached to the computer to make up a total system. CP/M is installed in the computer's memory in the same way as DOS and SOS. It is loaded from an outside storage device (disk drive). Once loaded into memory, it manages the operation of the computer system and its communications with users and peripherals through a number of built-in commands and transient command programs. To operate CP/M on the Apple II, II+, and IIe computers you must install 80-column video display capability and a circuit board containing a Z-80 microprocessor chip. You must also ensure that your system has 64K of RAM available. The Z-80 card or CP/M card takes over operation of the computer by diverting control away from the 6502 chip. The Apple III computer is not CP/M compatible.

CP/M System Calls General System calls provide the method by which CP/M operates. They are built-in commands and subroutines which make the system work. These system calls are listed below:

SYSTEM CALL NUMBER	DESCRIPTION	VERSIONS USING UP TO 1.4	2.0 AND UP
0	Reset Operating System.	No	Yes
1	Unbuffered input from console.	Yes	Yes
2	Unbuffered output to console.	Yes	Yes
3	Input from reader device.	Yes	Yes
4	Output to punch device.	Yes	Yes
5	Output to list device.	Yes	Yes
6	Direct input/output to/from console.	No	Yes
7	Get status of input/output byte.	Yes	Yes
8	Set input/output byte status.	Yes	Yes
9	Print character string to console.	Yes	Yes
10	Read console buffer.	Yes	Yes
11	Get status of console.	Yes	Yes
12	Display CP/M version number.	No	Yes
13	Reset disk system.	Yes	Yes
14	Select disk drive for use.	Yes	Yes
15	Open a disk file.	Yes	Yes
16	Close a disk file.	Yes	Yes
17	Search for file name (first occurence)	Yes	Yes
18	Search for next file name occurence.	Yes	Yes
19	Delete a disk file.	Yes	Yes
20	Sequential record read command.	Yes	Yes
21	Sequential record write command.	Yes	Yes

SYSTEM CALL NUMBER	DESCRIPTION	VERSIONS USING UP TO 1.4	2.0 AND UP
22	Create a disk file.	Yes	Yes
23	Rename a disk file.	Yes	Yes
24	Display address of disk log in vector	Yes	Yes
25	Display drive number of current drive	Yes	Yes
26	Set address of input/output buffer for disk.	Yes	Yes
27	Get disk drive allocation vector.	Yes	Yes
28	Write-protect a disk.	No	Yes
29	Get address of read-only vector.	No	Yes
30	Set attributes of disk file.	No	Yes
31	Get address of disk parameter block.	No	Yes
32	Set user code & get user code.	No	Yes
33	Read random access record.	No	Yes
34	Write random access record.	No	Yes
35	Determine file size.	No	Yes
36	Set random record field in file control block.	No	Yes

CP/M, Versions of The first version of CP/M available on the market for general use was called CP/M 1.3. The next version was CP/M 1.4 which improved somewhat on the first version. The next version introduced contained a number of very powerful features which made the first version obsolete. This version, CP/M 2.0, and subsequent versions offer about 12 more features. See CP/M System Calls.

CPM...Critical Path Method Scheduling* Records up to 600 employment and scheduling information items. Date started, days worked, special activities, and more may be stored for recall. 48K; printer. Chriswalt Publications, Inc.

CPS Characters Per Second or Cycles Per Second

CPU Central Processing Unit. The device in charge of fetching, decoding, and executing instructions. It contains a control unit, an ALU, and other related facilities with registers, clocks, or drivers. The Apple II and II+ computers use a 6502 chip. The IIe and the III use a 6502A microprocessor.

CPX A Machine language command which instructs the computer to compare the value in the X register with a specified value before executing the next step in the Machine language program or subroutine.

CPY A Machine language command which instructs the computer to compare the value in the Y register with a specified value before executing the next step in the Machine language program or subroutine.

Crash A situation where the system becomes inoperative from hardware or software malfunction. A head crash refers to the accidental impact of the read/write head upon the diskette surface.

Crazy Sentences* A fun program. You feed in a list of nouns, adjectives, verbs, and adverbs, and out come "crazy sentences." 32K. Edutech Corp.

CRC Cyclic Redundancy Check. A binary polynomial used to check information in blocks of data. All single-bit errors are detected. When used with an additional Longitudinal Redundancy Check (LRC), all two-bit errors are detected and all one-bit errors corrected. The two check sums (CRC and LRC) are calculated based on the data and appended to it. When the data is received or reread, the CRC and LRC are recalculated and compared to the earlier CRC and LRC. Any difference indicates that a bit has changed. The CRC and LRC act like parity bits, except that they work on a whole block of data rather than one byte.

CREATE CREATE is an Apple III Business BASIC statement which is used to make root directories, subdirectories, text files, and data files on the Apple III computer. The name of the file must be preceded by the CREATE statement and must be followed by the file type. For example:

```
CREATE/Payroll/Wages/DATA
```

Create usually refers to making a new file on diskette, as opposed to modifying an existing file.

Create A Lesson* Custom design your own examinations to test for comprehension in any area required. Questions may be in multiple-choice, true/false, or short answer format. 48K. MSSS D, Inc.

Creative Computing Computer magazine. One of a number of popular magazines which contain useful information concerning the Apple computer and available hardware and software for it. Most computer stores and larger bookstores carry a good assortment of these magazines. See the listing under magazines for addresses and subscription rates.

Creative Financing* If you invest in bonds, stocks, trust deeds, or income property, or if you want to figure out the cost of your home mortgage or consumer loan, this package helps you in decision-making. See the impact of inflation, taxes, cash flow timing, and time value of money. You can compare dissimilar loans and investments in a few minutes. Printouts are available for monthly interest and principal payment schedules for loan packages; annual depreciation schedules for complex component depreciation; projections in tables of year-end onsale profits; and projections of cash flows. Analysis for these transactions includes yield to maturity for discounted bonds, value of ownership versus sale-leaseback, risk evaluation through "what if" comparisons, and equivalent compound annual interest rate of loan package. Howard Software Services.

Creativity Life Dynamic Package, The* Whether your talents are musical, poetic, or artistic, this program will help develop those skills. 48K. Avant-Garde Creations.

Creativity Tool Box* Poetic, artistic, and musical persons will value this efficient program. Includes seventy-two style combinations, sound effects, and hi-res scrolling. 48K. Avant-Garde Creations.

Criaturas Excepcionales* Students "construct a creature" by giving descriptive English phrases. Phrases are inserted into a story about the creature and students can draw pictures of their creation. Grade levels 2 through 5. 32K. NTS Software.

Crop History* This program will retain up to five years of soil test data and field production records. This can be used as auto-load data for H.C.I.'s Soil Test Recommendation Program. Farmplan Computer Systems, Inc.

Crop Management Package* Maintains separate records for each crop including field applications, cash flow situation, crop budget, and gross profit reports. Farmplan Computer Systems, Inc.

Crop Production* The farmer with no prior computer experience can use this program to maintain income and expense records for his grain production operation. Income and yield for each acre are seperately maintained. Direct costs, such as fertilizer and expenses for operating machinery, are determined as well as indirect costs, such as equipment depreciation and taxes. Two disk drives are required. Cherrygarth Farms Software, Inc.

Crop Yields* Given the weight, in pounds, and the moisture content of the grain harvested in an area, this program will determine crop yield. Computerized Farm Information Systems, Inc.

Crosstalk Two signals interfering with one another.

CROSSTALK* A communications program well-known in the industry, this asynchronous communications package has most of the bells and whistles you might need. Microstuf.

Crosstalk* Software that allows you to participate in the world of data communications through the use of your computer and a modem. You can now have access to timesharing computer systems, a wide variety of information resources, electronic bulletin boards, and more. You also have the ability to communicate with other computers in your home or at your office. This is an easy-to-use system that includes many powerful features, e.g., exchanging files, data capture, and modem parameter control. Microstuf, Inc.

CRT Cathode Ray Tube. A computer terminal using a CRT that displays characters or pictures. Also called a monitor, screen, or terminal.

CRTC CRT Controller. A chip or circut which provides the necessary control signals to interface a CRT to the I/O bus of an MPU.

Crystal Quartz crystal whose piezoelectric vibrational modes issue extremely accurate frequency for clock timing.

Crystal Systems* Learn the concepts of symmetry with 3-D illustrations. Includes orthorhombic, monoclinic, isometric, and crystallographic axes. 48K. Tape 'n Text—Williamsville Publications.

CS Chip Select or Code Segment.

CTS Clear To Send. Control line from the modem to the terminal stating the data may be sent because the carrier is present. RS-232C is standard.

Cuantos?* Practice counting separate items in a set in this Spanish equivalent of "how many?" Grade levels kindergarten through first. 32K. NTS Software.

Current Disk Drive When DOS is booted the Apple II, Apple II+, or Apple IIe computers search the slots starting with the highest numbered slot for input. In all of these computers the disk drive controller card is usually installed in slot 6. The disk drive connected to the upper set of pins on the disk drive controller card is designated as drive 1 in DOS. The drive connected to the lower set of pins is designated as drive 2. The computer seeks drive 1 automatically upon booting. In the case of a warm start rather than the cold start described above, the computer can be directed to seek data or programs from a second drive in a particular slot or a disk drive in another slot. In the case of disk drive number 2 in slot 6, you would instruct the computer to seek this drive by entering:

PR #6, D2

In either case, the current drive is the disk drive in use at the time. This drive may be changed in the manner described above.

In Apple III SOS, disk drives like other peripherals must be accessed through a device driver which is either included in SOS or available on the system utilities disk. The driver for disk drives is included in SOS. This driver comes into play when a command such as LOAD or SAVE is given to the computer. It seeks the disk drive last used unless it is directed to do otherwise. The designation of current disk drive may be changed by typing .D1 if you are using drive 2 and .D2 if you are using drive 1.

In CP/M, disk drives are designated as drive A and drive B. The current disk drive designator is displayed next to the system prompt. If it is drive A, you see A> as a prompt. If it is drive B you see B>. To change the current drive you must enter the drive number followed by a colon (:) and press RETURN.

Curriculum Management System* Use this system to help with curriculum development and instructional planning. Reports and curriculum printouts are generated and easily updated. Included is a special function to enable information to be shared within school districts; and a national network for curriculum exchange has been initiated. 64K; 8K memory expansion card; upper/lower case input and output display; two disk drives. Learning Tools, Inc.

Curriculum Manager, The* A great aid for the teacher to monitor individual students' progress toward learning goals. Schedules, lessons, and tests can be set up and results compiled for reports showing progress. Class-wide results can also be shown. Its easy to learn and comes with full documentation. Requires 80-column printer. The Corporation For Public Information.

Cursor BASIC. Find current location. See POS.

Cursor The cursor on a computer screen is a special symbol which indicates the position of the next character to be displayed as a result of input from the keyboard or other sources. Apple computers display a flashing square. Some programs which run on Apple computers use the underline symbol or a similar indicator.

Cursor Down With the Apple II and Apple II+ computers the cursor may be moved down with an ESCape-C key combination. On either of these computers with the Auto Start ROM installed, ESCape-M is also available. The Apple IIe and Apple III computers use the Down Arrow key to move the cursor down. In a program, CALL-922 will move the cursor down on line while maintaining its horizontal position. CALL-926 will move it down one line at the left edge of the screen.

Cursor, Find Current Location The current horizontal position of the cursor on the screen may be determined by typing:

?"Cursor Position is";POS(0)

followed by pressing RETURN. The question mark treats the POS(0) as input. The computer will respond by displaying CURSOR POSITION IS (X), where (X) represents the current horizontal position such as 12 or 20. This function is only available in Applesoft BASIC. In Integer BASIC and Applesoft BASIC you would type:

PEEK (36)

followed by RETURN. To find the vertical position you would use Peek (37).

Cursor—Home To home the cursor means to return the cursor to the upper left corner of the screen. In Applesoft BASIC you home the cursor and clear the screen by typing:

HOME

followed by RETURN. In Integer BASIC and Applesoft BASIC, CALL-936 accomplishes the same thing, as does CTRL-L. The CTRL-Y combination moves the cursor to the upper left corner of the screen of the Apple IIe, but the screen is not cleared when it is used.

Cursor Left With the Apple II and Apple II+ computers, the cursor may be moved one space to the left with the left arrow key if you wish to erase from memory the characters over which the cursor moves. Otherwise, the editing mode must be used by pressing ESCape-B. On computers with the Auto Start ROM installed, ESCape-J works the same way. On both computers, CALL-1002 backs the cursor one space. The Apple IIe and Apple III computers use the left arrow.

Cursor Right With the Apple II and Apple II+ computers, the cursor may be moved right one space by pressing the right arrow key or the space bar. The space bar erases all characters the cursor crosses. The right arrow key reads them to memory. ESCape-A also moves the cursor to the right one space without reading the characters it crosses into memory. With the Auto start ROM, ESCape-J accomplishes the same thing as ESCape-A. The Apple IIe and Apple III computers use only the right arrow key.

Cursor Up With the Apple II and Apple II+ computers, the cursor is moved up one space by pressing ESCape-D. With the Auto Start ROM installed, ESC-I may also be used. CALL-958 used in a program moves the cursor up one line. The Apple IIe and Apple III computers use the Up Arrow key.

Curve* Create professional-quality graphs and charts with this easy-to-use program that includes a variety of plotting capabilities. No programming experience is required to use this flexible program in the fields of scientific and technical research, engineering, and others. A Curve Subroutines package that offers you customized hardcopy graphics in conjunction with your other BASIC programs is available separately. Thorough and fully illustrated manuals are included. West Coast Consultants.

Curve—U.S.A.* Plots a map of U.S.A. with options on the HIPLOT or Watanabe plotters. Can be used as a tool to relate statistics. Color maps can be plotted with a variety of shading options. User can: plot boundary of U.S. mainland and outline each state; change plotter pens at prescribed times or select pen colors; label state wtih mail code; construct "LEGEND" box with shading and color characteristics. West Coast Consultants.

Curve Copy* Because this program is in Machine language, it is extremely quick and will scan map pictures from hi-res screen to Houston Plotter in one of three sizes. A field can be inverted to show the negative of a hi-res picture. Line patterns are color-dependent. West Coast Consultants.

Curve Fitter* Facilitates choosing a curve to fit the results of your experiments. Some methods that are available are: scaling and transformations, averaging, smoothing, interpolation (polynomial, cubic spline, or Stineman), least squares fitting (polynomial, geometric, or exponential) and interpolation of unknown values from the fitted curve. After data is entered from the keyboard or disk, a high-resolution graph is mechanically drawn and labels are printed on the axes. Then you chose one of the above methods and look at the results superimposed on your experimental points. You may actually compare the results of different methods and choose the one that is best for your data. The disk contains five demonstrations, which show the uses of this program. Interactive Microware Inc.

Curve Fitter* Plot smooth data curves with this program which includes scaling, conversion to log, or constant offset. Data can be entered from disk, the keyboard, or from analog instrumentation such as pH meters. Additional features include saving data to disk, selectable plotting symbols, numbered axes, and curve smoothing and averaging. 48K. Sensational Software.

Curve II* Two-dimensional graphics tool. This program can be used in engineering, research, scientific and business applications. Users can develop their own graphics. Subroutines can be added to compute tables of values. Some features are: control of scale numbers, ability to plot linear and logarithmic error bars; universal shading routine; special bar graph; options for dotted grid lines, enhanced-length tic marks and enhanced curve tracers; and arc and circle generator routine. West Coast Consultants.

Curve-Fit* A hard copy graphics program for professionals to conduct projection forcasting and trend analysis. The following fitting schemes are available: straight lines, polynomial equations (to the ninth degree), exponential curves, and power curves. West Coast Consultants.

Curve's Three-D* Plots and labels graphs with the ability to rotate 360 degrees. Illustrates x, y, and z functions and "space" curves. West Coast Consultants.

Custom IC Integrated Circuit built to the customer's specifications.

Custom Meat Processing System* Prints a production worksheet expressing each customer's meat processing order. It provides a record for listing the number and weight of each type of cut and a billing invoice as well. Computerized Farm Information Systems, Inc.

Cyber-Tech Stock Valuation Program* Determine undervalued stocks with the aid of this program that utilizes the most up to date stock analysis techniques. The user inputs data from investment periodicals and the computer outputs projected growth rates, earnings, dividends, internal rate of return, payout ratios, and assigns the stock an overall attractiveness rating. Cyber-Tech.

Cyberdrive* A high-performance 13.5 or 27MB hard disk drive subsystem in one cabinet with an integrated mini-cartridge tape for secure data back-up. The system offers an integrated business-oriented backup device. Media transfer is assured because of the Cyberdrive's availability for other systems, regardless of the host hardware or operating system. Cybernetics, Inc.

CyberLOGO Turtle* A full featured implementation of LOGO, including turtlegraphics, sound, color, a full-screen editor, and more. The included STEP mode allows the user to step through a program one instruction at a time; a great aid in debugging. 48K. Cybertronics International.

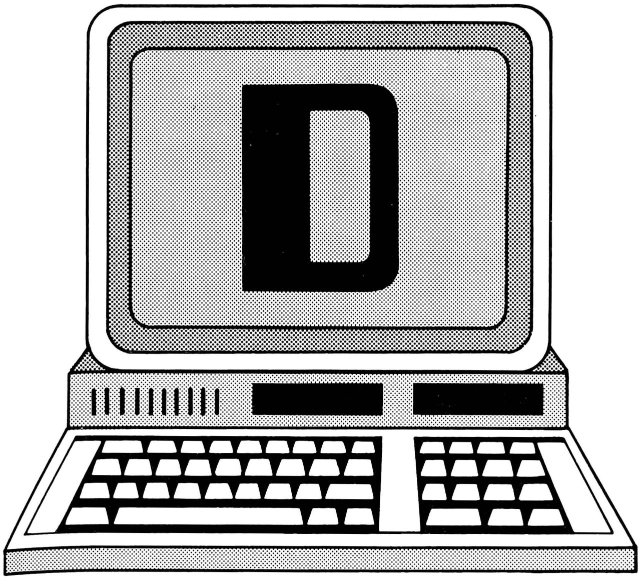
Cycle Graphs* Used to analyze the effects of the long term cycles in the horoscope. The user can choose to view a single- or two-cycle combination and enter the cycle on a graph. Then, the cycle is plotted in relation to passage of time. The complete cycle of a planet's relationship to a degree or cusp unfolds on the graph. This program will trace any number of individual cycles on the graph and permit you to quantify two cycles, that are relative to each other, by averaging them. Then, the united peaks and valleys are charted on the hi-res grid. 16K. Matrix Software.

Cycle Time Total time a device needs to complete one internal cycle before becoming available again.

Cycle-Stealing Another processor gains access to a microprocessor bus for one cycle. The second processor may be an internal subsidiary processor, as in DMA.

Cytron Masters* As master of the Cytrons (robots), you command their movements during battles on the planet. You have many types of rockets, mines, and blasters at your disposal. You control the energy power stations as well. The enemy's command center is the main target and when it's captured, you've won the game. Includes multiple skill levels for use with the Apple III. Strategic Simulations.

C/65 C/65 is a compiler for use with the Apple and other 6502 microprocessor based computers. This compiler uses very powerful utilities to convert programs written in CBASIC to Assembly language. It is recommended for the experienced programmer and CP/M user. Optimized Systems Software.



D Codes. ASCII = 68, HEX = 44. d—ASCII = 100, HEX = 64.

D Data line or the hexadecimal symbol for the decimal number 13: D base 16 = 13 base 10 = 15 base 8 = 1101 base 2.

D-Control System Call When the Apple III computer user sends a control character to the console driver, the language system in use generates a system call. Assembly language programs use system calls to communicate with files and peripheral devices used by the Apple III. The user can also employ some system calls directly, specifically the D-Status and D-Control calls. When you use a system call directly, you must supply three parameters. The syntax for the control call is D-Control (device number, control code, control list). The devices which may be used with the Apple III are the console (keyboard and monitor), graphics display hardware, RS-232C printers (serial), RS-232C input/-output devices (modems), and the audio system. Disk drives are accessed through a utility program called the Filer.

To use the control system call, you need to know the available control codes and the required control list comments, listed on the next page.

D Flag One of the flags of the Apple II+ and IIe processor status register. This flag, when set, enables decimal arithmetic. When clear, it disables decimal arithmetic with binary numbers.

D Flip-Flop A flip-flop circuit with a delayed reaction. The output is determined by previous input.

D Status System Call See D-Control System Calls for more information. On the Apple III computer, the user may employ direct system calls to ascertain the status of various control codes used by device drivers. He may also set (enable) or clear (disable) various functions by setting or clearing control codes. The syntax for status calls is:

D-status <device number>,<status code>,
<status list>.

The status code and required status list comment are presented on page 129 for each driver.

D/A Digital to Analog. Conversion from the digital representation used in computers to the analog signals used to drive speakers, motors, etc.

DAC Digital to Analog Converter. A device which converts digital signals (such as a computer's I/O bus) to analog signals which could control an external device, through varying voltage or current levels.

Dados Y Dominos* Presents addition and subtraction with or without illustration. In this Spanish version of "Dice 'N Dominoes", the student must press the ENTER key after he types his answer. 32K; Applesoft. NTS Software.

Dairy Enterprise Analysis System* This is part of the larger Enterprise Analysis System, designed for use with the data generated and stored by the companion General Ledger program. As in the other Enterprise Analysis Systems packages, the profitability of your dairy enterprise is measured in saleable units produced versus the production cost per unit. Computerized Farm Information Systems, Inc.

Dairy Herd Management System* Maintains individual cow and calf records, reflecting each cow's health, milk production, and breeding history. Computerized Farm Information Systems, Inc.

Daisy Chain A method of establishing priorities for interrupts. Units capable of interrupting the system can either pass on or block a processor acknowledge signal. The highest priority is given to the unit electrically closest to the processor. On the Apple IIe computer, interrupt request and direct memory access signals are available at the expansion slots. Peripheral cards can call for an interrupt, or direct memory access signals are available at the expansion slots. Peripheral cards can call for an interrupt of direct memory access. If two cards make the same request at the same time, they tie for data busses or address busses. Each connector is wired with two pairs of pins which act as a priority for daisy chaining. This arrangement assigns priorities to demands on the data busses and address busses.

D-Control System Calls

	CONTROL CODE	FUNCTION	REQUIRED LIST COMMENT
CONSOLE	0	Resets console options to default.	NIL
CONSOLE	1	Restores status table from buffer.	Buffer size, buffer.
CONSOLE	2	Sets line termination status & character.	Line status, character.
CONSOLE	3	Sets keyboard mode.	Mode status.
CONSOLE	4	Sets type ahead buffer size.	Buffer size.
CONSOLE	5	Empty type ahead buffer.	NIL
CONSOLE	6	Set attention even parameter.	Priority, ID, Address, Character
CONSOLE	7	Reserved.	NIL
CONSOLE	8	Sets any key event parameters.	Priority, ID, Address.
CONSOLE	9	Reserved.	NIL
CONSOLE	10	Sets no wait status mode.	No wait status.
CONSOLE	11	Sets screen echo mode status.	Screen echo status.
CONSOLE	12	Sets retype mode status.	Retype status.
CONSOLE	13	Sets backspace.	Backspace status.
CONSOLE	14	Sets status of cancel function.	Cancel status.
CONSOLE	15	Sets escape mode status.	Escape mode
CONSOLE	16	Downloads character set.	Character set.
CONSOLE	17	Loads partial character set.	Count, definition.
CONSOLE	18	Restore contents video port.	View Port contents.
GRAPHICS	0	Resets console options to default.	NIL
GRAPHICS	1	Restores status table from buffer.	Buffer size, buffer.
RS 232	0	Resets driver & clears I/O buffers	NIL
RS 232	1	Loads device parameters from buffer.	Buffer size, buffer.
RS 232	2	Loads newline flag byte & newline character byte.	Buffer
RS 232	3	Sets break time.	Break time.

Note: The term "set" means to enable. On all drivers the ASCII $80 enables. The term "clear" means disable. On all drivers the ASCII $00 disables.

These control codes enable the user to select particular features of the devices he wishes to utilize.

Daisy Chain—Disk Drives The Apple III computer is equipped with one built-in disk drive which is named .D1 in all commands and queries. Up to three external disk drives may be used by this computer. The first external disk drive is attached to a socket on the back of the Apple III's case. The second external drive is attached to a socket on the back of the first drive. The third external drive is attached to a socket on the back of the second drive. This method of attaching peripherals in series is sometimes called "daisy-chaining."

Daisy Wheel Printer An impact printer which has a wheel with radial spokes bearing type to produce letter quality output.

DAKIN5 Programming Aids 3.3* A utility program compatible with the Corvus Disk Drive system, contains the following programs: The LISTer, The Line Cross Reference, The Variable Cross Reference, The Peeker, The Patcher, The Copier, The Calculator, The Diskette Copy, The Array Editor, The Screen Printer, The Prompter, and The Cruncher. DAKIN5 Corporation.

Dan's Disk Utilities* Examine and modify any track and sector on your disk. This program allows you to recover deleted files, determine correct file size, enter patches to Machine language programs on disk, and examine text files to check program operation. Includes documentation to help you understand disk file structures. Expunge is a program which will remove DOS from a disk to free additional usable space. Micro Software Systems.

Darker, Printing Dot matrix printers are capable of producing double-strike characters which darken their normal print. Double-strike printing causes

D-Status System Calls

	CONTROL CODE	FUNCTION	REQUIRED LIST COMMENT
CONSOLE	0	No operation.	NIL
CONSOLE	1	Copy status table to buffer.	Buffer size, buffer.
CONSOLE	2	Display termination character.	Line status, character.
CONSOLE	3	Display keyboard mode.	Mode status.
CONSOLE	4	Display type ahead buffer size.	Buffer size.
CONSOLE	5	Display keystrokes in type ahead buffer.	Keystroke count.
CONSOLE	6	Display attention event parameters.	Event, ID, Address, Character.
CONSOLE	7	Reserved.	NIL
CONSOLE	8	Display any key event parameters.	Priority, ID, Address.
CONSOLE	9	Reserved.	NIL
CONSOLE	10	Display status of no wait mode.	No wait status.
CONSOLE	11	Display status of screen echo mode.	Screen echo status.
CONSOLE	12	Display retype mode status.	Retype status.
CONSOLE	13	Display backspace status coded.	Backspace status.
CONSOLE	14	Display cancel function status.	Cancel status.
CONSOLE	15	Display escape mode status.	Escape mode status.
CONSOLE	16	Display cursor position.	Horizontal, vertical.
CONSOLE	17	Display ASCII character at cursor.	Character byte.
CONSOLE	18	Copy contents of the viewport status list.	Viewport data.
GRAPHICS	1	Save contents of status table to buffer.	Buffer size, buffer.
RS 232	0	No operation.	NIL
RS 232	1	Copy control parameters from buffer	Buffer size, buffer.

the dot matrix printer to reprint every character with a slight shift down the page. The dots printed on the second pass tend to fill in most of the spaces left by the dots on the first pass. This process creates a darker, more solid character. Word processing programs often allow the embedding of the control characters or ASCII characters which produce such special effects. Each dot matrix printer will accept an ASCII character to start and stop the process. For example, the Epson MX-80* uses CHR$(71) to turn on double strike and CHR$(72) to turn it off. Before passing the double-strike command the printer, it must receive the ASCII equivalent of ESCAPE-CHR$(27).

DAS Data Acquisition System. See Data Acquisition.

DATA Applesoft BASIC and Apple III Business BASIC utilize the DATA statement to present data to a program via a READ command. This statement is only available from within a program (deferred mode). DATA presented to the computer in this fashion can be real numbers (on the Apple II+, IIe, and III), integers, and strings. The elements of the DATA statement must be separated by commas. String data need not be enclosed in parentheses unless it contains spaces, commas, or colons. DATA statements are not executed by themselves. A READ statement is required for the computer to make use of this DATA. See READ.

Data Acquisition The collection of data from external sensors, usually in analog form.

Data Block—Move and Verify A Machine language routine can be executed from the Apple's Monitor to move blocks of data or programs from one memory location to another and to verify that the move was successful. The format for this routine is as follows:

destination address < starting
address.end address M

For example:

```
* 335 < 315.328 M
```

To examine the data in addresses 315 to 328 prior to the move, type

```
315.328
```

followed by RETURN.

To verify the move, use the same format as was used for the Move, but the "M" would be changed to a "V."

Data Bus The set of lines carrying data. All system components are normally connected to the data bus.

Data Capture 4.0* An intelligent terminal program, specifically designed to use all the features of the Micromodem IIe*. It can be modified and copied easily because of the format and documentation. Consequently, you don't have to worry about backup. The data files are automatically captured and manipulations (edit, view, save to or load from disk, transmit to a remote system) of data in the memory are easily performed. Also compatible with lower case adaptors for the Apple II. Included is an automatic logon utility to use with The Source and a HELP text file which will help you use Data Capture 4.0 to its fullest capacity. Southwestern Data Systems.

Data Carrier Detect Signal When one computer is communicating with another via telephone lines, each computer recognizes the underlying signal which will carry the data from one place to another. The modem of one computer is not connected with that of the other computer unless the other computer's carrier is detected. Some modems are equipped with an indicator light which signifies the other computer's carrier is being received. Some communications programs place a message on the screen which acknowledges carrier detection.

Once connection has been made with any serial device such as a modem or printer, the sending device waits for an "able to receive data" signal from the receiving device. The detection of the carrier signal is an indicator that the receiving device is able to receive data.

Data Diskette Used to Store Data. A diskette is called a data diskette when it is used primarily or totally to store data rather than programs. Likewise, program diskete refers to a diskete which is primarily used to store data processing programs. A system diskette, on the other hand, is used principally to store DOS commands and related utility-type programs. Often a diskette will contain both data and the programs needed to process the data.

Data Element Data elements are the discrete pieces of information provided to the computer via input statements or DATA and READ statements. In either case these elements may be numbers or strings. In the latter case they must be separated by commas.

Data Entry Data entry is the process of providing the information upon which a computer program will act. Data may be entered and acted upon immediately. This is inefficient when large amounts of data are required. In this case data can be entered in logical blocks prior to indicating that the computer should accept the data. Such indication is given by pressing the RETURN key. Programs which accept data entry should be interactive, provide the user with prompts, display the entered data to indicate possible errors, and should contain error-trapping routines. If such programs are not interactive, the screen should display an entry form which is self-explanatory.

Data File A named collection of information, usually stored on magnetic media.

Data Format Parameter The Apple III printer driver (RS-232C) and serial device driver (RS-232C) are controlled by a device configuration block. The printer driver's configuration block contains five parameters. The RS-232C device driver's configuration block contains twelve parameters. A parameter common to both drivers is the data format parameter. For the printer driver, this parameter dictates the arrangement of bits in the data stream sent to the printer by the computer. For the RS-232C device driver, this parameter serves the same purpose as it does for the printer driver. There are nine standard formats for both devices. These formats are listed below:

PARAMETER VALUE	**FORMAT**
22	7 bits, odd parity.
26	7 bits, even parity.
2A	7 bits, mark parity (parity bit = 1)
2E	7 bits, space parity (parity bit = 0)
00	8 bits, no parity.
42	6 bits, odd parity.
46	6 bits, even parity.
4A	6 bits, mark parity.
4E	6 bits, space parity.

All serial devices used by a computer must establish such formats to enable communications between the computer and the devices. The setting of this parameter applies equally to serial devices operated on the Apple II, Apple II+, and Apple IIe computers.

Data Handler* Easy to use database program. User defined file format, full editing, sort, print, merge, are all handled without user programming. 7K; Applesoft. Business Computer Services Company.

Data Interchange Format Files Data Interchange Format files, or DIF files as they are frequently abbreviated, are files which have been formatted in a very specific fashion to allow the data contained in the files to be passed readily from one commercial program to another. This file format was introduced by Software Arts, Inc., developer of VisiCalc*, to allow VisiCalc files to be used by other programs such as business graphics programs and database managers. It was also intended to use this format to pass data from other programs to VisiCalc. In VisiCalc, DIF files are files which contain the data and labels specified by the user when he saves this data. The starting point for saving the data is the cursor's position in the VisiCalc matrix. The ending point is the lower right corner of the data as supplied by the user. No formulas or repeating labels are stored in a DIF file. Data is arranged in vectors and tuples which are determined by the manner in which data is arranged into columns and rows in the spreadsheet and by the manner in which data is saved (as columns or rows) to the file. Each DIF file is made up of a header and the data itself. The header is each label in the file. The data itself is recorded and located in the matrix. DIF files may be listed and read by programs written in BASIC. They may be added to one another, subtracted from one another and otherwise treated mathematically by programs written in BASIC. A growing number of programs are able to use DIF files generated by VisiCalc and other programs which use the format. The programs VisiTrend/VisiPlot*, Accounting Plus II, ApplePlot*, Apple II Business Graphics*, Apple III Business Graphics*, Bridge*, Chartman*, Chart Master*, Compuserve*, DB Master*, DIFmaster*, The Executive Secretary*, pfs: Graph*, Graph n Calc*, List Handler*, MagiCalc*, SpeedSTAT*, Statistics with Daisy, TK! Solver*, Transfer III*, UltraPlot/DIF/DataGraph*, VersaPlotter*, VisiFile*, VisiSchedule*, VisiTerm*, VisiWorld*, and others are able to use DIF files.

Data List Pointer When Applesoft BASIC and Apple III Business BASIC employ the DATA and READ statements, the computer uses the READ statement to utilize data elements from the DATA statement. If the elements of a data statement are fewer than the numbers of variables in the READ statement the program will seek a higher program line containing data. If it finds no such line it will return the message "END OF DATA" or "OUT OF DATA ERROR IN LINE". If the data elements are greater than the list of variables in the READ statement, the BASIC language in use places a data list pointer after the last element used. The next READ statement uses the first data element after this pointer. The RESTORE statement, CLEAR, and RUN set the pointer back to the first element in the DATA statement.

Data Manager For Weather Observations* For those who like to keep track of the weather with their Apple III. This program will assist you in storing all kinds of readings, collected from any station, and give you all sorts of tables, charts, comparisons, etc. Includes stored values back to 1951. Climate Assessment Technology, Inc.

Data Master* Builds the capabilities of Information Master and Data Base Management System. Includes extensive error-trapping features, file reorganization without the need to reenter data, and provides for the renaming of systems and modifying field types. Uses two criteria for reorganization: field relocation criteria and record selection criteria. 48K. High Technology Software Co.

Data or Program Concatenation Adding one item on at the end of others to produce one longer data or program item.

Data Plot* Numerical data can be plotted on single, multiple, or mixed line bar charts. A detailed menu and instruction manual help the user design simple or complex graphs. 48K. Muse Software.

Data Plus* Four modules which are an enhancement to Accounting Plus II System. Accounting Plus II data can be converted to DIF format. This is the same format used by VisiCalc*. General ledger, accounts payable, accounts receivable, and inventory data can be manipulated and/or plotted by using VisiCalc*, VisiTrend*, or VisiPlot*. Software Dimensions, Inc.

Data Rate The data rate of any serial device such as a modem or serial interface card is its baud rate. The baud rate is defined as the number of bits per second which the device can send or receive.

Data Rate Table A data rate table is available to Apple III users in the Apple Data Device Drivers Manual. This table lists the ASCII values used to set the baud rate of the RS-232 driver.

Data Reporter, The* Beyond the database capability, this program offers complete editing of data, graphing, calculations and statistical analysis, and label maker utility. 48K; DOS 3.3. Synergistic Software.

Data Security Insuring that data (or programs) cannot be altered improperly. For example, in an accounts receivable system, steps must be taken to insure that clients cannot alter their invoices. Data security consists of guaranteeing both data integrity and data secrecy or privacy.

Data Separator A circuit in disk controllers which separates the data from the carrier in the signals read from the diskette surface.

Data Set File or a group of related data elements.

Data Set Ready Data set ready is a bit in a device status list which signals the readiness of a destination device such as a printer or another computer to receive signals from the computer which is sending the data.

Data Tablet A graphic input peripheral which digitizes the position of a stylus on a special sensory surface.

Data Terminal Ready The Apple III computer may be connected to a serial printer via a modem or via an RS-232C socket on the back of the computer case. If this connection is used rather than a modem, the computer waits for a data terminal ready signal to change the data terminal ready block in the device status list prior to sending data to the printer.

Data Transfer Rate The rate of transfer of data from one place to another, such as from disk to memory or from memory to memory.

Data Types A specific interpretation applied to binary data, such as integer, real, character (string), etc.

Database A systematic organization of data files for central access, retrieval, and update.

Database III* A versatile data storage program that is easy to set up and use. With your Apple III, the user designs the database to fit his needs. Creative Software.

Database Management for the Apple* By Nat Wadsworth. This book supplies an extensive discussion of the theory and operation of database management and its applications. The advantage to the use of this text is that all the routines are written in Applesoft and thus load and sort in seconds or minutes. This might not be what you are looking for, but if you want to understand how files and other portions of databases operate, this gives you a good start. It also has a chapter on customizing your database and adding "bells and whistles." The final topic is expansion of the memory-resident system presented in the book into one which will use random access files, thus expanding the storage capabilities, and allowing access to the disk during the run of the program. The book includes line-by-line commentaries, a complete cross-reference of variables used, and a list of cross-referenced line numbers. Hayden Book Co., Inc.

Database Management Software Within the text of this book we refer to some useful file and record handling programs. Some have been explained in this encyclopedia while others are referenced by name and vendor below. These aids simply help the user store and retrieve information easily. A number of features to this end include defining the data formats (file, record, reports, headings, etc.), storage in memory (sequential, random access, ascending, descending, etc.), retrieval methods (sort, merge, call, etc.), editing, data inputting, and data outputting. Each program may have special features that makes it a little different from others, though most are very similar. All will help the user keep track of information in the home or office.

Program Name	**Vendor**
Access	Spider Software
Apple Record Manager	Connecticut Information Systems
Audiovisual Cataloging Sys., The	Cavri Systems
Cardfile	Digital Marketing
Central Information File System	Nibble/Micro-Spec, Inc.
Condor Series 20	Advanced Logic Systems
Daily Diary	Persimmon Software
Data Base Management	Monument Computer Service
Data Factory, The	Micro Lab
Data Manager	Hayden Book Company
Data Management System	VisiCorp
Data Perfect	LJK Enterprises, Inc.
Datadex	Information Unlimited Software
dataKEYper	ESP Computer Resources, Inc.
Datatree	Apple Computer,Inc.

dBASE II (Database Mgt. Sys.)	Ashton-Tate
Fas-File	Gryphon Systems
Filemaster	Business Master
Filer	Kiloware
File-Fax (Database Mgt. Sys.)	TMQ Software, Inc.
File Wiz	Softhouse
Info-Data Base Manager Program	Software Technology For Computers
Information Master	High Technology Software Prod.
Infotree	Sir-Tech
Know Your Client	Execuware
Microconductor, The	Microcomputer Techonology, Inc.
Mini Factory, The	Micro Lab
Omnifile	Educational Computing Systems
Organizer 2.0	Rocky Mountain Software Inc.
Pascal Database	Arizona Computer Systems
PDBase	I O T C, Inc.
PDQ	Howard W. Sams & Co.
Pegasus: Release 2	Shakti Systems, Inc.
Personal Library Cataloger	Last
PFAS the ISAM for Pascal	Gryphon Systems
Pronto-DOS	Beagle Bros. Micro Software
Q/Report	TCS Software
Scientist	Monument Computer Service
Selector V	Digital Marketing
Simple	TCS Software
Statpro	Blue Lakes Computing
Sup'R Filer	M & R Enterprises
Total Utilities	TCS Software
Transactor	Softagon, Inc.
Transit	Hight Technology Software Prod.
UltraFile	Continental Software
Z65 Data Base Processor	International Software Enterprises

Database Programs Database programs are used to gather, classify, and sort indexes and files. These programs then summarize, list, or otherwise manipulate the data into user designed reports which use all or only selected portions of the data. There are large number of such programs on the market for Apple computers. Some of these programs require CP/M and others run directly on the computer. Some require two disk drives. A list of these programs appear below.

PRODUCT	MANUFACTURER	COMPUTER	CP/M	TWO DISK DRIVES
DB Master	Stoneware Microcomputer,Inc.	II+,IIe	-	No
dBASE II	Ashton-Tate	II,II+,IIe	Yes	Yes
Data Factory 5.0	Micro Lab	II,II+,IIe	-	
Data Manager III	Micro Lab	III	-	No
Data Perfect	LJK	II,II+,IIe	-	No
Data Reporter	Synergistic	II+,IIe	-	

PRODUCT	MANUFACTURER	COMPUTER	CP/M	TWO DISK DRIVES
Data Dex	IUS	II,II+,IIe	-	No
DataFax	Link Systems	II,II+,IIe	-	Yes
Data Star	Micro Pro	II,II+,IIe	Yes	
File Fax	TMQ Software	II,II+,IIe	-	
FMS-80, 81, 82	DSR Associates	II,II+,IIe	-	
GBS Application Development System	Quality Software	II,II+,IIe	Yes	
General Manager II	Sierra On-Line	II,II+,IIe	-	
IFO Version II	STC	II+,IIe	-	Yes
Info Star	Micro Pro	II,II+,IIe	Yes	
Modifiable Database	Synergistic	II,II+,IIe	-	
pfs;File	Software Publishing	II,II+,IIe	-	No
QuickFile	Apple Computer, Inc.	III	-	Yes
Versa Form	Applied Software Technology	II,II+,IIe	-	
VisiDex	VisiCorp	II,II+,IIe	-	No
VisiFile	VisiCorp	II+,IIe	-	Yes

Database Software The following software is reviewed within this encyclopedia. See Accession Plus; Apple III Record Processing Services (RPS); Apple Literature Database; Appleroots (Geneology Software for the Apple); Bird Classification Program; Bowling Data System; Catalogit!!; Chips—TTL & CMOS; Database III; DataFax; Data Handler; Data Master; Datadex; D.B. Power for dBase II; D.B. Master; dBase II; Disk Organizer; DocuCalc; Dow Jones News & Quotes Reporter; Easy Filer; Electronic Library Aide; ELF Statistical Package; EPF IV; E. P. I. Retrieval System Reading; FCM; First Edition; Instant Recall; Librarian List; Mailing List Database; Mailing List Management; Mailing/Phone List; Mailmaster; MailMerge; Mail/-Phone List; Market Charter; MCAT 2.0; Micro-Atlas; Micro Finesse; Multifield Information System/Utilities Disk; Name & Address; Net-Works; Overdue Books Program; Questionnaire Analyzer; Reprogrammable Data Base Program; Science Lab Database; Small Group Roster; Smart Analyst and Graphics Package, The; Special Education System; Stamp Collector, The; Stock Control System; Stockfile; Stockroom; Stockseller; Super Sort & Search; Superfox; Trend-Spotter; and VisiFile; see also Database Programs.

Datacomm* A communications package for the Apple equipped with Pascal. There are two levels of program commands: Datacomm Terminal Program (facilitates data and program exchange) and Pascal Micromodem II routines (lets the Pascal programmer include data communications commands in his original programs). Here are some other things you will find in DataComm: printing capabilities while connected; commands in English; 110 or 300 baud transmission; and Micromodem II autodial/auto answer capabilities. Mini Microcomputer Software.

Datacope Single Disk Sort* Specify the criteria and let this sort do the rest. Can be easily incorporated and works with amazing speed, but it cannot be used as a subroutine—only as a stand-alone program. Works on random access files (fixed record length) only and will sort an entire disk of data in a single file. Datascope.

DataDex* A database management system that will assist you in creating fields and records. Translates records from one file to another. 48K; DOS 3.3. Information Unlimited Software, Inc.

DataFax* A free-form database package written in compiled Pascal. The documentation comes in a 5″ by 8″ binder, and has both an exhaustive tutorial and a complete, indexed, reference section. The searching capabilities are extensive, allow Boolean logic (AND and OR), parenthetical hierarchy, and wildcards, all of which may be combined with sorting.

The data may be entered in any way that is convenient for the user, from a fixed form to an unstructured page of "notes." The program is not designed for fixed form notation (see pfs:File*), so you have to enter the field name on each new form. You can also leave the field name off, and just type the information in the same location each time; this, however, restricts the use of the database to the one who designed the form.

The database is conceived of as a series of "folders," such as the manila file folders you use in a file cabinet. You may also have pages within these folders. The theoretical limit is 255 pages per folder, but just as it would not be productive to put that many pages in a folder it is a better use of DataFax to make several folders with fewer pages in each. As each folder with its accompanying keywords (used for later searching) is finished, it is saved to the disk in drive 2. The program disk should remain in drive #1 to have other sections of the main program available as needed. Keywords may be from one to twenty-eight characters in length; there must be at least one keyword associated with each folder. 64K; two disk drives. Link Systems.

Data-Graph* A computer assisted graphing system that is designed for numeric database management. You can turn numbers into graphs that accurately display the information in color and hi-res. Formatting takes place in single-, dual-, or four-quadrant graphs that can be displayed or printed. Hayden Book Company.

DataLink* Word of mouth has it: "Nothing communicates like Datalink," so you many want to look into this excellent piece of software. Just push one button and Datalink will dial you in and log you on. Should you need to redial, Datalink will do it for you automatically. It works with almost any card or modem that is used with the Apple. Link Systems.

Datalock* Protect your programs by storing them on disk in an encrypted format. This will keep anyone from reading (or writing to) your files. When you encrypt a file, it is rewritten as a series of permutations and changes based on a special 56-bit key defined by the user. There are over seventy-two quadrillion possible key definitions which make it practically impossible for someone to break the code. Decryption can only be accomplished with the identical key used for encryption. This process does not affect the contents of the file. Datalock is a chip on a board which has been configured for the Apple Bus. No programming is necessary to take advantage of this system; the software provided is user friendly and only requires answers to a few prompts before it's ready to work. 48K; Applesoft BASIC. Atlantis Computers.

DataStar (Rev. 1.1)* A data entry, retreival, and update system that, when combined with WordStar* and ReportStar*, will give you a very extensive data management system. Includes two programs: Formgen and DataStar. Z-80 Machine Code. Two disks and Z-80 card. MicroPro International Corp.

Data*Trans* A communications software package that is designed to: 1) let your Apple computer communicate with another Apple or a timesharing main frame; 2) print transmitted or received data; 3) convert numerical data for input to Visiplot*, Visitrend* and Visicalc*; 4) save time and connecting charges with a 300/1200 baud rate version; 5) permit insertion or deletion of lines from the memory buffer; 6) transfer disk text files to an Apple or timesharing mainframe; 7) copy mainframe data files into your Apple disk files with the help of prompts. ABT Microcomputer Software.

Datebook II* To keep track of all appointments, this program will help an office organize memos and dates easily. The user can set up the format and update the files quickly. Schedule and store daily, weekly, monthly, or even yearly appointments until you need them. Files can be kept for separate accounts and reminders. Requires CP/M; 56K RAM. Digital Marketing.

Day Adjusted Weaning Weights* Compare the known or suspected birth weights of calves with their weaning weights, in order to determine superior genetic stock. A table of standard birth weights for particular breeds is included. AG-COM.

Daymaster* Organize your appointment schedule with this menu-driven system. Print activities and meetings daily, weekly, or monthly for up to three people. Executive Data Systems, Inc.

DB Master* A full capacity database program that has a variety of features for user defined formats. The two areas utilized are: Utility Disk format and Data Disk format. The Utility will contain the structure for the data to be called, printed, or updated. The data disks will contain the actual data to be called and formatted. Other aspects of the program utilize Data Types, Storage Methods and Access Times, Sorts, Capacity, Report Generator, and other features. There are a few updated versions of this program as well as some utility packages. Check with the vendor to see which will suit your needs the best. Requires either ROM Applesoft BASIC (or

Language System) with one to four disk drives, or DOS 3.3 (or Language System) with a printer recommended. Stoneware Microproducts, Inc.

D.B. POWER for dBASE II* Interactive training for dBASE II creates a sample database. The sample system teaches you to enter and sort data, add, modify, change, and edit important data to generate comprehensive reports, and develop mailing lists. Includes a disk and User Handbook. American Training International, Inc.

dBASE II* A powerful software package driven by natural language, similar to English. It allows you to tailor a relational database management system to your own needs.

dBASE II is by far the most popular information management tool available on any computer. More than 140,000 copies of the program have been sold, and there are over 800 commercial applications available using Runtime dBASE.

Using built-in dBASE II commands and functions, you can create and alter the structure of database files as well as readily access and manipulate the stored data through direct console interaction. You may also write your own programs for this purpose. An advantage of writing programs in dBASE II, as compared with other languages such as BASIC or FORTRAN, is that you may incorporate any built-in dBASE II command, saving much program writing time (not to mention programmer hair-pulling).

dBASE II is ideal for home and office applications, since you may employ its programming language to write menu-driven programs for all required database management operations and routines. Thus you can construct database management systems for operators with absolutely no knowledge of the dBASE II program.

Incorporated in dBASE II's program are many "safety" features to protect against unnecessary and data-destructive errors. The most recent version of the program also includes a HELP file which provides a short description of all dBASE II commands, their full syntax, and examples. Ashton-Tate.

DBMS DataBase Management System. A program providing a general mechanism for systematic storage and retrieval of data from a database.

D-Bus Internal destination bus in a CPU, from the ALU to the registers.

DC Direct Current.

D.C. Hayes Micromodem IIe* See Micromodem IIe*.

DC Motor A type of motor designed to operate with a direct current power source, often used in variable speed applications.

D-Cat* A directly coupled modem that is easy to use, inexpensive and portable. The only direct modem that the FCC has approved for handset jack connection with modular phones. Transmits data over telephone networks; permits one computer to "talk" with another; data exchange is really quick (thirty characters per second). Attractive, easily installed, and equipped with power plugs, this is another winner from Novation. Novation, Inc.

DCB Abbreviation for Driver Configuration Block as used in the Apple III Standard Device Drivers Manual. For a printer, this configuration block holds five parameters. These parameters are data rate, ouput format, printer delay, carriage return, character, and form feed character. The contents of this configuration block may be examined by running the System Configuration Program and selecting the Edit Driver Parameters option. You may leave these parameters as they are or change them with this program. If you change them, you must return to the program menu and select the Generate New System option to save the reconfigured printer driver on your boot diskette.

DCD Abbreviation for Data Carrier Detect bit or Data Carrier Detect signal. See Data Carrier Detect Signal.

DCE Data Communications Equipment. Equipment used to interface with a data communications network. Generally, a modem.

DCM Data Communication Multiplexer. A device which allows several communications processes to operate concurrently over a single channel (such as one phone line). This can work through time division multiplexing, which oscillates the channel rapidly from one conversation to another. It will also work through frequency-division multiplexing, which shifts around two different frequencies to simultaneously transmit two different conversations.

DCO Digitally Controlled Oscillator. An oscillator using a digital circuit to control frequency, rather than an analog circuit as with a normal oscillator.

DDT A debugging program available in CP/M. This program may be used to correct errors in programs found by ASM, PIP, or LOAD. It may also be used to correct errors which are discovered as programs are executed. DDT is a COM file. It loads the designated file into the computer's main memory. To use DDT, enter:

```
DDT <filename>
```

including disk drive designator if program to be debugged is not on current disk drive. DDT takes over from the command control processor and loads the designated program. DDT uses the following commands:

COMMAND	MEANING
I	Input a Hex or COM file to memory.
R	Read file in memory and display next available memory address after program being debugged.
GO	Terminates DDT.
SAVE	Save all or part of file in memory.

See Debugger.

Deadlock A situation in which two processes wait indefinitely for each other.

Death* Use your intelligence and creativity to enable your troops to win the germ warfare battle. Little Genius, Ltd.

Debouncing Eliminating the rapid signal fluctuations which accompany a change of state in mechanical switches. Mechanical springs bounce repeatedly until the contact is finally closed or opened. Typical debounce time is 5 to 10 milliseconds for stable contact. Debouncing may be performed by hardware (latch) or software (delay).

Debug Mode Applesoft programs may be debugged by using the command TRACE in either the immediate or deferred mode. This command displays the line number of each statement as it is executed. When this display is occurring the computer is said to be in the debug mode. NOTRACE is used to terminate this command. See TRACE and NOTRACE.

Debug or Test a Program A programmer must make sure that a program will correctly process all of the types of data for which it is intended. Samples of the data are prepared (test data) and the program is executed using this data (a test run). The program's outputs (reports, screen displays, files, etc.) are then verified to be as specified. An error in the processing logic of a program is called a "bug," hence the terms "debug" and "bug-free."

Debugger An essential program designed to facilitate software debugging. At a minimum, it provides breakpoints, dump facilities, register and memory examine/modify, preferably in symbolic form.

Debugging Eliminating the bugs in a program; troubleshooting and correcting mistakes or errors.

Debugging Assembly Language Programs Assembly language programs may be listed and debugged with the Mini-Assembler which is in ROM on the Apple II computer without the Auto Start ROM. If your computer has the Auto Start ROM installed you must load the Mini-Assembler into RAM to use it. Once you access the Mini-Assembler, the Step command can be used to display the program line by line. This Monitor command disassembles and displays the program instruction designated by the location counter. The instruction is then executed. Then the register contents are displayed. The Mini-Assembler TRACE command allows the user to see each program step as it is executed and to stop the listing by pressing reset. The Mini-Assembler STEP command is used to decode, display, and execute one program line at a time.

Debugging Programs Applesoft BASIC, Integer BASIC, and Apple III Business BASIC all offer the programmer a number of methods to find and remedy program errors. a list of such commands, the language which uses them and their function is presented below.

In addition to such built-in commands there are a number of error messages and error display subroutines which may be incorporated in all BASIC programs to ensure that the user and programmer can discover what causes the program to malfunction. There are also several program line editors and debugging programs available.

DEBUGGING PROGRAMS

COMMAND OR STATEMENT	LANGUAGE	HOW TO USE
PRINT	Applesoft, Integer, Bus BASIC	Display program location messages. Print interim results.
TRACE	Applesoft, Integer, Bus BASIC	Display each line number as executed.
NO TRACE	Applesoft, Integer, Bus BASIC	Turn off TRACE.
DSP	Integer	Display each execution of a particular command or function.
NO DSP	Integer	Turn off DSP
LIST	Applesoft, Integer, Bus BASIC	Display program listing or specific lines.

Debugging Utility Software Packages A number of utility programs on the market have the ability to scan program code and check it for syntax, variable name, field definition, and other errors. They are handy in flagging problems in the early stages of the programming process. While some of the programs will work with different languages and have unique features, most are similar in their basic functions. Consult your dealer or vendor for assistance in choosing the one that fits your needs.

PROGRAM	VENDOR
Applebug	Microproducts
Apple-80	Dan McCreary
Bug, The	Sensible Software
Bug/65	Optimized Systems Software
Bugbyter	Computer-Advanced Ideas
John's Debugger	Broderick & Associates
Key Perfect	Nibble/Micro-Spark, Inc.

DEC Digital Equipment Corporation, manufacturers of the PDP family of computers.

Decade Counter A counter that advances in increments of ten.

Decimal Flag One of the flags in the Processor Status Register. When this flag is set, the computer executes addition and subtraction in the decimal mode. The mnemonic for setting this mode is SED (SEt Decimal mode). To return to binary addition or subtraction, this flag must be cleared with a CLD mnemonic (CLear Decimal mode).

Decimal Places The Apple II+ and Apple II computers with Applesoft in ROM or in the language card may display numbers with up to nine decimal places. Unless instructed in a program to display results as integer values, all of the built-in Applesoft mathematical or trigonometric functions will display results up to this number of decimal spaces. The Applesoft Reference Manual contains a routine for rounding results to a specific number of decimal spaces. This routine is presented below for your use.

D = number of decimal spaces
X = math/trig function and number

```
    LET P = 10—D
    X = INT(X*P+.5)/P
```

Floating point arithmetic on the Apple III computer is accurate to 32 bits.

Decimals* Designed to teach elementary students the concepts of the decimal system. A progress exam is included with this six-program package. Quality Educational Designs.

Decimals* Test your ability to convert fractions to decimals by division. Twenty different levels of difficulty will help increase your skills. 48K. The Computer Connection.

Decimals and Percents* Included are multiplication and division, addition and subtraction, names and numbers, and changing percents to decimals and decimals to percents. Program comes with a Teacher's Guide. 32K; 48K. Educational Teaching Aids.

Decision Master* Receive a second opinion before you decide to buy instead of rent, make an investment, or seek different employment. A full analysis is made of all the pros and cons to help you make the most advisable choice. Efficiently handles day-to-day decisions. Syntonic Software Corp.

Decision-Making Simulations in Accounting for the Microcomputer* Students are required to make realistic business decisions. DOS 3.3. McGraw-Hill Book Company.

Decode Cycle The second cycle of the fetch-decode-execute sequence of instruction execution. The instruction, contained in the instruction register, is decoded into a set, or a sequence, of control signals to all the required elements of the system, such as register gates, ALU functions, or external devices.

Decoder A logical unit which decodes two, three, four or more inputs into mutually exclusive outputs. A 3-bit decoder will have eight outputs because a 3-bit number can have eight possible values.

Decrement The process of reducing a value by another value. In Machine language one value is usually decremented by a regular step such as 1, 5, 10, etc. until a comparative value is reached. Then the program branches or loops. The same thing may be accomplished in a BASIC program by using a STEP <n> statement.

Dedicated Register A register used exclusively to contain a specific item.

Dee-Zigns* A fun, user friendly program that brings out the artist in you and lets you create patterns. Paul's Electric Computer.

DEF FN Applesoft BASIC and Apple III Business BASIC Statement. DEF FN defines and names a numeric expression or equation. The format is:

```
DEF FN<name>[<arg>[,<arg>...>] =
           <expression>
```

<name> is a valid variable name. This name, pre-

ceded by FN, will be the name of the function.

<arg> is an argument. It represents a variable name in the function definition that will be replaced with a value when the function is called.

<expression> defines the return value of the function. It can be numeric or string but must match the type that was declared by the <name>.

The definition of the function is limited to one statement. Arguments <arg> that appear in the function definition serve only to define the function; they do not affect program variables that have the same name. A variable name used in the <expression> does not have to appear in the list of arguments. If it does, the value of the argument is supplied when the function is called. Otherwise, the current value of the variable is used.

The function type determines whether the function returns a numeric or string value. The type of function is declared by <name>, in the same way as variables are declared. If the type of <expression> does not match the function type, a "TYPE MISMATCH" error is displayed. If the function is numeric, the value of the expression is converted to the precision specified by <name> before it is returned to the calling statement.

A DEF FN statement must be executed to define a function before you may call that function. If a function is called before it has been defined, "UNDEF/D FUNCTION ERROR" is displayed. On the other hand, a function may be defined more than once. The most recently executed definition is used.

Default Character Set The Apple III computer allows the user to design and employ any character set that he desires on screen and on a dot matrix printer. The graphics driver of the computer normally uses the standard Apple III character set which is loaded into the computer by the System Configuration Program. This character set is the default character set used by the Apple III computer. The user can change the graphics driver character set, but the character set displayed on the console will not be changed. If, however, the console character set is changed, the graphics character set will default to the console character set.

Default Disk Drive The default disk drive is the disk drive assumed to be in use by a program or bootstrap routine. If a program or an operating system is configured so that the program or operating system diskette will be in drive 1 for DOS 3.3 or drive A for CP/M, then all access to the program or operating system will be carried out through that particular disk drive.

Default Graphics The Apple III graphics driver is controlled by the parameters contained in the graphics driver configuration block. The configuration block which is contained in the system configuration is loaded when the system is booted. This configuration is the default configuration for graphics. It may be altered by the user with the driver edit feature of the system configuration program.

Default Parameters The parameter values supplied by a computer system when no explicit values are provided by a program or a programmer.

Default Value A value for a parameter or variable which will be supplied by a program or system, if you do not specify a value.

Deferred Execution See Execution, Deferred.

Deferred Execution Commands Certain commands in Applesoft BASIC, Integer BASIC, and Apple III Business BASIC may only be executed from a program line. Such commands are called "deferred execution" commands, as opposed to "immediate execution" commands which may be addressed directly to the computer without a line number. A list of deferred mode-only execution commands is listed below:

COMMAND	LANGUAGE
END	Integer
FOR	Integer
GOSUB	Integer
INPUT	Integer, Applesoft
NEXT	Integer
RETURN	Integer
DATA	Applesoft, Apple III Business BASIC
DEF FN	Applesoft, Apple III Business BASIC
GET	Applesoft, Apple III Business BASIC
ON ERR GO TO	Applesoft
RESUME	Applesoft, Apple III Business BASIC
ON...GOTO	Applesoft
ON...GOSUB	Applesoft

Defining Functions Applesoft BASIC and Apple III Business BASIC allow the user to define mathematical functions which are not available in ROM and to use such functions in a program or from the immediate mode if they have already been executed in a program. See DEF FN.

Definite Article, German Language* The classification, analysis, and grammar of the German definite article. 48K. Avant-Garde Creations.

DEL A command available in Integer BASIC, Applesoft BASIC, and Apple III Business BASIC which allows the user to delete a single line or range of lines from the program currently in memory. For example:

```
DEL 100
```

would delete line 100 only.

```
DEL 100-200
```

would delete all lines from line 100 to line 200 (including lines 100 and 200).

DEL Synonym for ERASE, the CP/M command to DELete or ERASE files. As an internal command DEL is part of COMMAND.COM. The basic format is:

```
DEL <filespec>
```

The <filespec> can optionally specify the drive, file name, and extension. Example:

```
DEL B:FILE2.TXT
```

You can use the global characters ? and * to erase multiple files. Do this carefully! If you specify

```
DEL *.*
```

all files—except hidden files (q.v.)—will be erased. In this case, DOS will ask:

```
Are you sure (Y/N)?/
```

Answer N if you really didn't want all files erased and to cancel the command as entered.

Answer Y to execute the command.

Delay Loop Delay loops are used in programs to allow time for a message to appear on the screen, to allow time for a graphics display to remain on the screen, and to otherwise delay further execution of a program for a particular purpose. This can be accomplished with a FOR...NEXT loop such as:

```
125 FOR PAUSE = 1 TO 1000
130 NEXT PAUSE : REM DELAY LOOP.
```

DELETE DELETE is a DOS command used to erase files or programs stored on disk. The syntax for this command is:

```
DELETE <file name>
```

for the current or default disk drive and DELETE file name, S number, D number for another disk drive. DELETE is also an Apple III SOS command described already. In SOS, however, an entire subdirectory may be erased as well as an individual file.

Delete a Driver The Apple III System Configuration Program on the SOS Utilities diskette contains an option called Delete a Driver. This option may be used if the boot diskette being read contains a number of drivers in its configuration set up. If one or more drivers in the configuration must be deleted, press the letter "D" when the menu is displayed. A list of drivers in memory will be displayed by number and by name on the screen. The list shown below is typical:

```
CURRENT DRIVER CONFIGURATION:
(* = INACTIVE)
1 CONSOLE$
2 PRINTER
3 .FMTO 1
4 .FMTD 2
5 +.FMTD 3
6 +.FMTD 4
7 +.GRAFIX
8 .RS232
```

A prompt appears at the bottom of the screen on the left side—"Select Driver to be Deleted." If you want to delete the RS-232 driver you enter an 8 after this prompt and press RETURN, causing the program to remove the RS-232 driver. If no other drivers were to be removed, you would return to the System Configuration Program Menu by pressing ESCape.

Delete a Driver File Driver files stored in a configuration on an SOS boot diskette for the Apple III may be deleted in the same fashion as drivers. See Delete a Driver.

Delete a Line The user can instruct the computer to ignore everything on the present line by typing CTRL-X on the Apple II, Apple II+, Apple IIe, and Apple III computers. This key sequence places a backslash on the screen and stops the line from being entered into memory. Another method often used to delete a line is to type the line number followed immediately by RETURN. The most common method is to use the DEL command followed by the line number. See DEL.

Delete BASIC Program Lines Applesoft BASIC, Integer BASIC, and Apple III Business BASIC all allow the user to delete program lines in the fashion described below:

To delete program line 100 enter:

```
DELETE 100
```

or

```
100
```

followed by pressing RETURN.

To delete program lines 100 to 200 enter:

```
DELETE 100-200
```

To delete all program lines up to 100 enter:

```
DELETE-100
```

To delete program lines from 100 to the end of the program with DELETE, you must specify the final line number. If you want to delete lines to the end of your program, either LIST to find the last line number or enter a dummy line at the largest possible line number:65529. Then enter:

DELETE 100-65529

A dummy line might be: 65529 END.

Delete Current Line See Delete a Line.

Delete Files To delete a DOS file enter:

DELETE <file name>

If the message "FILE NOT FOUND" is displayed, check for typing errors or embedded (non-displayed) control characters.

Delete Files—Apple III Apple III SOS uses the file handling commands menu on the utilities diskette to handle files which have already been created. One of the options on this menu is Delete Files. If this option is selected by pressing the letter "D" followed by RETURN when this menu is displayed, a prompt appears in the lower left corner of the screen. This prompt is shown below:

```
Delete the Files:
[]
```

A cursor rests at the extreme left of the brackets. The name of the file to be deleted should be entered at the cursor along with the appropriate pathname. For example, to delete a file called WAGES in a directory called PAYROLL, you would enter:

/PAYROLL/WAGES

inside the brackets and then press RETURN. The computer would then reply with a confirmation query. Y for yes should then be entered.

Delete Files—DOS Files may be deleted from diskettes handled by DOS 3.3 on the Apple II, Apple II+, and Apple IIe computers by entering:

DELETE <file name>

DELete Key A special key on the Apple IIe keyboard which provides the user with a destructive backspace. This key moves the cursor back one space and deletes the character under the cursor.

Delete Last Character To delete the last character typed on the Apple II and Apple II+ you must backspace the cursor and touch the spacebar or type over the character with the correct character. The DELete key is used on the Apple IIe to backspace and to delete the character under the cursor. The Apple III uses the same method as the Apple II and Apple II+.

Delete Programs Programs may be deleted from a DOS 3.3 initialized diskette in the same fashion as files are deleted. Type:

DELETE <program name>

followed by RETURN.

Delete to End of Screen CALL-954 clears the text screen to its lower right hand corner from the cursor. ESC-F in the edit mode accomplishes the same thing.

Delimiter A character which indicates the end of a sequence of characters. In English the common delimiter of words is the space.

Delimiters, CP/M Parameters on CP/M commands can be delimited (separated) by any of these characters: space, comma, semicolon, equal sign, or tab key. In a file name, the ":"and "." are specified to delimit drive name, and extension respectively.

Demo Disk, The* Includes samples of various programs such as Graphics of Sound Option, Rationality from Aliveness Disk, Conditioning from Conditioning Disk, Jungle Safari from Environment Disk, and Shape Table from Superfont program. Features hi-res, game card, and shape tables. 48K; DOS 3.3 or 3.2. Avant-Garde Creations.

Demo Disk 2* A sample and demonstration disk that offers information on Action Sounds and Hi-Res Scrolling, The Mailing Label and Filing System, Sentence Diagramming, Parts of Speech Usage, and Super Shape Draw. Avant-Garde Creations.

Demo Package* A demonstration program which shows you how Insurance Micro Software's Benicom and Financial Needs Analysis programs work. Complete sample programs are run for each of the programs. Purchase price may be applied toward the purchase of either program. Apple II+, 64K, disk. Insurance Micro Software, Inc.

Demo-Graphics* This program can be used at both the high school and college levels. It deals with the causes of demographic changes and conditions, and can be used for projecting population data, creating computer simulations to test demographic hypotheses, and more. It is flexible and easy-to-use, and is divided into four programs. Conduit.

Demultiplexer A logical circuit which can route digital signals from one source to many different destinations. The unit distributes information to many locations or devices in the system.

Depreciation* Provides a system for depreciating as many as eight hundred capital assets. Purchase cost can be as much as one million for any period from one to ninety-nine years. Also computes investment tax credit, pro-rates depreciation when necessary and permits conversion of depreciation with inventory, disposed property list, and recovered cost list. Year-to-date depreciation is figured for each item as well as grand total depreciaton, total accumulated depreciation, total ITC, total amount invested, and total salvage value. Reports all items sold, including sale price, initial cost and basis, depreciation to sale date, and tax gain and loss. 32K. Moneydisk.

Depreciation Planner, The* A flexible and up-to-date program for a business that is large enough to need records and planning for capitalized assets. Should the tax laws change, the user will be able to modify the schedules. Excellent documentation and customer support. 48K. Dakin5 Corporation.

Depreciation/Critical Path/Profit Analysis* Each part of this package helps the small business calculate and project productivity. Depreciation allows a choice of straight line, sum of years, or multiple declining balance. Critical Path and Profit offers features to graphically show trends and business movement in and around the company. MPA Enterprises.

Derby Downs* This is a simulation of a race track, complete with pari-mutual betting, an exacta, a daily double, and a quinella (like the exacta but you don't have to specify the order of finish). You may examine the entire day's card of six races (eight horses each), or just the list of horses for a single race. The form sheet, for both horses and jockeys, is blank when you first boot the disk, but after some races are run, the form will be filled in; the form on the last twenty races run will be kept on disk so that you may consult it on subsequent days' play. The tote board shows the approximate odds for the race and the total pool at the time. A maximum of ten bets per player (there may be up to ten players) is allowed to speed up the game; otherwise someone might try to cover all possible combinations since it's only computer money! The actual race is run with eight low-resolution blocks of different colors around a rectangular track. This lack of realistic graphics is the only drawback to the program, as the calculations, the random selection of the results, and the opportunity to test your knowledge of the ponies without losing your entire paycheck are all excellently done. Raff Craft.

Derivative of Sine* Gives a demonstration argument that the derivative of the sine function is indeed the cosine function. Apple's color and high-resolution graphics are very effectively used. 32K. Math Software.

DESC Defense Electronics Supply Center. Manages procurement policies and monitors quality of military electronics contracts.

Descenders The parts of printed or displayed characters that extend below an imaginary line drawn through the base of the characters (baseline).

Descriptive Statistics* A package designed to be a supplement to an elementary statistics course. The four programs include: FREQTAB which builds a Frequency Table for a given set of data; GROUP which calculates the mean, standard deviation, and variance; STATMEAS which calculates measures of dispersion and location; and FREQDIST which graphs a frequency histogram and builds a Frequency Distribution. COM Press.

Descriptor A brief Machine language file used by DOS to manage file storage. This data block contains descriptive information about a file. This information includes file name, type, starting address, storage locations, and length. See File Control Block.

Designer Picture Series* The Designer Wheels make possible the production of astrological chart wheels. Rivals the quality of pre-printed forms. This totally automatic disk package has output that contains the Designer Wheel on the first page. The second page contains an aspect/midpoint grid. This package can read files made by M-64 and M-30 (disk version) in single chart or batch mode. This is not a natal calculation package but rather a sophisticated print-out package which accesses chart files that the M-64 or M-30 creates. Two kinds of Designer Packages are available: 1) Natal Chart Wheel (mandala type) and 2) 360-degree Self-Aspecting Wheel. 48K. Matrix Software.

Designer, The* An easy-to-use program that lets you draw many kinds of designs and diagrams. You can modify the images on the screen and the computer can generate HPLOTing. Drawings can be saved to disk. Archives.

Designer's Toolkit* A menu-driven, advanced program intended for drafting professionals and architects. A maximum of ten different brush strokes, fifteen font types, and 300 colors are available to the user. Features text insertions, magnification, and editing. Includes an instructions manual and demonstration disk. Apple Computer, Inc.

Desk Calculator II* Contains ninety-eight calculator functions. If you have a printer, hard copy of your calculations is possible. Telephone Software Connection.

Desk Calendar* A memo-type package that can store appointments, memos, reminders, or a daily diary of activities. It generates a one-year calendar—

all major holidays incorporated. 48K. Telephone Software Connection.

Desk Calendar II* A time management tool. This calendar will remind you of those important appointments. It will print out a daily schedule that can be updated, and it also has room for notes. Search capacities are included, and this system will work with most clocks. Telephone Software Connection.

Desktop/Plan II* A fast and easy way to automate and organize your money analysis, budgeting and business planning. Takes you through final calculation and prints out a high-quality report. Complicated calculations become easier to handle. Can handle large financial "models". Makes it useful for consolidating department budgets and combining the results into a company budget. Desktop/-Plan II is a good, productive system. VisiCorp.

Destructive Backspace A backspace which instructs the computer to forget any character touched by the cursor. The left arrow key on the Apple II, Apple II+, and Apple III provides a destructive backspace. The DELete key on the Apple IIe provides the same result.

Destructive Cancel This term applies to the act of cancelling the current line (on which the cursor rests). This is accomplished on all Apple computers by pressing CTRL-X.

Development System A system with the capabilities for efficient hardware and software application development for a given microprocessor. Such a system typically includes a microcomputer, monitor, printer, mass storage (often diskettes or hard disk), PROM programmer, and an in-circuit emulator. Software is often developed on a system totally different from the system on which it will run. This occurs because the target system does not have enough memory or other resources to support development, or because the system is not actually available yet.

Development Tools Hardware and software aids intended for use in developing programs and/or hardware systems.

Device Any hardware or peripheral which supports the activities of a computer system, or which is supported by the activities of a computer system. A device may be built in and communicate internally, or may be connected to the system and communicate via cables and an interface card. Devices include printers, disk drives, plotters, modems, etc.

Device Driver An Apple III utility program used by SOS to allow the computer to communicate with external devices such as the console, printers, communications devices, etc. The device driver contains all the parameters to define the computer's interaction with the device. Device drivers may be changed and updated with the System Configuration Program contained on the Apple III utilities disk. Once saved as a permanent configuration, any driver will be used when the system is booted.

Device Menu A shorthand term for Device Handling Command Menu of the Apple III utilities disk. This menu allows the copying of one volume to another, renaming a volume, formatting a volume, verifying a volume, listing configured devices, and clock setting.

Device Names The Apple III SOS employs device names to direct output to or receive input from any device connected to the system. SOS employs up to 15 characters preceded by a period as a device name. .D1 refers to Drive 1; .Printer is obvious.

Device Names Names which may be used in place of a file name in many DOS, SOS, CP/M, or BASIC commands to specify that data is to come from or go to a device such as the keyboard, CRT, printer, etc., rather than a diskette/cassette file.

Device Names, Reserved These names have special meaning in CP/M. They may be used in most places that a file name occurs. They name devices that can originate or receive data, rather than diskette files. The colon at the end of a device name is optional.

Reserved Name	Description
CON:	Console, keyboard, screen. When used as an input device, press F6 key then Enter, to denote the end of file. With the EOF, CON: ends input
LST1: or PRN:	Parallel printer, as used for output
NUL:	Dummy device used in testing applications. End of file is designated when used for input data. When used for output, data is not written, but write functions are simulated.

DEX A Machine language instruction which instructs the computer to DEcrement (reduce) the value in the X register by one.

DEY A Machine language instruction which directs the computer to DEcrement the value in the Y register by one.

Diablo A Xerox-owned company which makes computer peripherals and computer systems. A supplier of daisy wheel printers.

Diagnostics A set of routines used to diagnose system malfunctions, and/or carry out standard performance tests. The Apple IIe computer is equipped with a diagnostics ROM chip. This ROM is enabled by a ROMEN 1 signal from the computer. A built-in self-test of the Apple IIe is activated by pressing Solid Apple (Closed Apple) along with CTRL and RESET. This test involves reading and writing each memory location, so any data or programs in memory during this test will be destroyed. The tests take about twenty seconds. When they are complete, a KERNEL OK message will appear on screen if everything is fine. Otherwise a service message will appear indicating that the computer should be taken to an authorized service center.

The Apple III computer runs a number of hardware tests each time its power switch is turned on. These diagnostics test RAM, ROM, Versatile Interface Adapters, Analog to Digital Converter, and the Zero Page Circuitry. As soon as these tests are complete, an attempt is made to boot the built-in disk drive.

A number of diagnostic programs are available commercially for the Apple II and Apple II+ computers. These programs perform memory tests, peripheral tests, video output tests, disk drive speed checks, and so on.

Dice 'N Dominoes* Addition and subtraction. Dice present addition problems up to 6 + 6 or subtraction problems to 12-6. Students may also work problems without graphics. Ten problems are in each set and there are three chances to correctly answer these questions. 32K. NTS Software.

Dic-Tio-Nary II* A spelling checker program that can be used with word processors and can interface with a host of other word files. Assembly language. 48K. Sierra On-Line Systems.

Dictionary Skills* A tutorial on how to extract information from dictionary entries. The user is asked questions about a displayed entry and rewarded for correct answers. Cassette or disk. Right On Programs.

Dictionary, The* A 28,000 word dictionary that features word search and is more than just a spelling verication program. Sierra On-Line Systems.

Die/Dice Circuit elements built of small rectangular pieces of silicon on a wafer. Each wafer has from several dozen to hundreds of rectangles or dice. Once mounted in a package, this is called a chip.

Diet Analysis* Calculate the decrease of calories needed to achieve your perfect weight. Body height, sex, activity level, and age are taken into consideration as you chose your own time limit. 48K. Apple Computer, Inc.

Digestive System, The* Become aware of your own body functions as you study this amazing system. 48K. Avant-Garde Creations.

Digisong Paks* Each pak contains ten to twenty musical selections of a particular era or theme. Compatible with the Music Composer* system. Examples of paks include Hymn Favorites, MMI Disco, Christmas Pak, and Oldies But Goodies. Micro-Music, Inc.

Digital Having discrete states. Digital logic may have from two to sixteen states. Most logic is binary logic, with two states, on or off.

Digital Analyzers: Logic, Timing Troubleshooting tools which allow the user to locate timing or logic errors.

Digitizer A device which converts analog information to its digital equivalent. Often used for devices obtaining input from a plotting surface and providing coordinates as output, such as a graphics tablet.

DIM A command available in Applesoft BASIC, Integer BASIC, and Apple III Business BASIC which reserves space in the computer's memory for arrays and strings. Integer BASIC is only capable of handling one-dimensional arrays and simple strings. The syntax of this command in Integer BASIC is:

DIM <variable> (<subscript>)

The subscript is enclosed in parentheses and indicates the number of different values which will be applied to the variable. The subscript dimensions the array. The computer automatically adds one to the subscript when it reserves space for the values of the variable. For strings, the subscript informs the computer of the anticipated maximum length of the string. Applesoft BASIC can handle single dimension and multiple dimension arrays of real numbers, integers, or strings. The type of array must be identified to the computer at the beginning of the command. Strings are identified by the dollar sign ($). Integers are identified by the percent sign (%). Real numbers have no symbolic identifier. The number of subscripts used in the command specify the number of dimensions in the array. The subscripts determine the number of elements in each dimension. The syntax for this command in Applesoft is:

DIM <variable> (<subscript 1>
[,<subscript 2>,...])

An example might look like variable A is an integer which has three dimensions with two elements each. The computer will reserve space for three elements in each subscript. The computer will reserve nine memory locations for this array.

Apple III Business BASIC provides for arrays in the same fashion as Applesoft BASIC. It allows for one more type of array. This type is an array made up of long integers (variables of up to nineteen points of precision) and identified by the ampersand (&).

DIM ERR Integer BASIC will sometimes display this error message on the screen. It means that a particular array has been dimensioned more than one time in the same program. Each array may only be dimensioned one time. To remedy the problem, change the variable name or eliminate the duplication by cancelling all but one of the dimensioning statements.

Dinosaurs* An educational program that teaches young children about dinosaurs. Ten dinosaurs are presented in hi-res shapes, and the child is expected to match these with a list of ten names. There is also a spelling program in which an incorrect letter brings a dinosaur into full view. The object is to spell a name correctly without full realization of the drawing. In another game the child, playing the role of a tyrannosaurus, must defend himself against other dinosaurs. Manual included. 48K. Cross Educational Software.

Diode A device which allows current to flow in one direction only.

DIP Pronounced "dip". Dual In-line Package. A standard IC package with two rows of pins 0.1" apart.

Dip Switches A collection of small switches on a DIP, used to select options on a circuit board without modifying the hardware.

DIR A CP/M command that is used to instruct the operating system to list the files present on the currently active disk drive. If the system prompt is A>, the user will be able to catalogue the disk on Drive A by typing DIR followed by RETURN. If the user is currently employing Drive A, but wishes to list the directory of the disk on another disk drive (such as Drive B), the user would type B: followed by RETURN, then DIR followed by RETURN.

DIR CP/M Diskette Directory Listing Command. DIR allows the CP/M user to see a list on the screen of all or selected files on a diskette. Each file displayed will show file name, size in bytes, and date and time last modified. A count of the number of files displayed is also provided. DIR is an internal command, part of COMMAND.COM.

DIR by itself lists all files on the current default drive. To list all files on another drive, specify the drive number, for example:

DIR B:

To list selected files, give a partial file specification. Examples:

All COM files on drive B:

DIR B:.COM
or
DIR B:*.COM

All files named FILE1 on drive B regardless of extension:

DIR B:FILE1
or
DIR B:FILE1.*

All files on drive C with names beginning with FILE and extensions beginning with B:

DIR C:FILE*.B*

To see files with no extension, use only the . :

DIR B:*.

DIR has two options—/P and /W. /P after the command causes the display to pause when the screen is full so it doesn't zip out of sight before you can read it. /W produces a wide display showing five file names and extensions across each line on the screen. Information on size, date and time of update are omitted. If you are simply trying to see if a file is on a diskette, this puts more information on one screen.

DIR—Used to Find a Program or File on a Diskette If you are in CP/M (prompt is A> or B>), for the default of a diskette drive, enter:

DIR

For diskette drive B, enter:

DIR B:

If you are in BASIC, use:

FILES
or
FILES B:

This is useful to find a program on file, if you are unsure of the exact spelling of its name. If you still cannot identify your program from DIR listings of all files, you may have to load and list the most likely looking candidates until you find it. This points out the usefulness of program and file names that remind you of what their purpose is ("mnemonic" names), and of a REM at the start of each program to make it easy to identify when listed.

Direct Mode This particular mode of communication between the user and the computer is one in which the user gives a command to the computer and the computer responds immediately. An example of this mode is as follows:

```
] PRINT 10 * 12
120
```

Directories See Directory. See Pathnames.

Directory A term used to describe the list of files on a diskette. The CATALOG command in Apple DOS and in Apple III SOS prints this information on the screen for the disk in the current drive. DIR accomplishes the same thing in CP/M.

Directory The table of contents of a file system which allows convenient access to specific files.

Directory Listing A listing on the screen of all of the files and programs on a diskette. See CATALOG and DIR.

Disasm/65* LISA 2.5 compatible for the Apple II/II+. Generates a symbolic disassembled listing of a Machine Code program which can be reassembled using LISA. Other features include relocation of Machine Code programs, handling of instructions, hex data, string data, address data, and stack address data. Lazer Systems.

Disassembled Listings If you have no Mini-Assembler available but wish to review Machine language instructions written for an Apple II, Apple II+, or Apple IIe computer, you can use the L command in the monitor mode. This command converts Machine language statements or commands into Assembly language. It also prints them out to a printer or displays them on the computer's screen. The syntax for this command is:

```
$ aaaa L
```

where aaaa is the memory of address in hexadecimal notation. Upon receipt of this command, the computer displays 20 Machine language statements converted to Assembly language beginnning at the specified address.

Disassembly The process of converting Machine language programs or routines into Assembly language displays showing mnemonics, values, addresses, etc.

Disclosure Statement* Completes the replacement form that many states require and provides a comparison of proposed policy with as many as four existing policies. Ten cases can be entered at once. A disclosure page is printed for each policy. Summary page compares the policy with the totals of all existing policies. The program will print text for each disclosure statement. RE/International Systems Corporation.

Discounted Cash Flow Analysis* Calculate portfolio rate of return, bond values, mortgages, installment loans, and more. Data can be merged, edited, or updated. Includes a user's manual. Isaac Software.

Disk A flat, circular magnetic storage medium which is rotated while in use. See also Diskette.

Disk Certifier and Copier* Check your new disks for flaws before you attempt to use them. After certifying, this program will format each disk for you. Also includes a fast Machine language disk-copying program for single- or dual-drive systems. Hayden Book Company.

Disk Controller Card A printed circuit board is installed to interface disk storage drives to the CPU of a computer.

Disk Controller Card Installation The installation of disk controller cards on the Apple II, Apple II+, and Apple IIe computers is done in essentially the same way for each of these computers. Computer power should be turned off. The cable which connects the disk drive to the controller card should be attached to the plug on the controller card marked with the number of the disk drive being installed. If only one disk drive is being attached, the plug for drive 1 must be used. Ensure that the cable connector which is attached to the controller card is facing the proper direction. For the Apple II and Apple II+ the cable may be attached to the card prior to leading the cable through the back of the computer case. On the Apple IIe the cable must be led through the back prior to attaching it to the controller card. Once the cable has been attached to the controller card, fit the controller card into the slot you wish to use for the disk drive. Press down firmly until the card is securely in place. The disk drive controller card may be installed in any slot between 1 and 7 on the Apple II and Apple II+ or between 1 and 6 on the Apple IIe. It is usually installed in slot 6 on all of these computers.

Disk Drive A device which provides the computer with the ability to store data, files, and programs on magnetic media. It also provides the ability to retrieve and use the stored data, files, and programs. Disk drives are mechanical devices internal or external to the computer. They use disks made of magnetically sensitive material for storing and retrieving information via read/write heads. The disks rotate within the disk drive. Communications between the computer and the disk drives is managed by the computer's operating system (DOS, BDOS, SOS, etc.). Before a disk can be used to store information, it must be initialized by the operating system which uses it. Initializing prepares the disk to receive information by placing a reference track and reference flags useful to the computer on the disk. Most disk drives use floppy disks. An Apple Disk II drive provides a capacity of 140K of storage on 16 sectors in 35 tracks of a single-sided disk. One company, Rana Systems, produces disk drives which offer even more capacity on 5 ¼" floppy disks. Their Elite One* disk drive uses 40 tracks and offers 163K storage. Their Elite Two* disk drive is a double-sided disk drive with 326K storage. Their Elite Three* disk drive is double-sided, double-density with 652K storage. Hard disk systems offer storage capacity in the megabyte range. See Hard Disk Systems—Apple-Compatible, and Double-Density Diskettes.

Disk Drive Emulator See Drive Emulation.

Disk Drive Number Disk drives are referred to by number in programs which use DOS or SOS. They are referred to by letter in CP/M. The Apple II, II+, and IIe computers can support up to eight disk drives. These disk drives are connected in pairs to four disk drive controller cards which are plugged into peripheral slots inside the Apple's case. The disk drive controller cards are generally plugged into slots 6, 5, 4, and 3 if space allows. The disk drives in the highest numbered slot are addressed first by the computer. The two disk drives in Slot 6 in the eight drive system would be addressed as S6, D1, and S6, D2. Disk drives in Slot 5 would be referred to as S5, D1, and S5, D2. Disk drives in Slots 4 and 3 would be referred to in a similar manner. Only the slot numbers would be different.

The disk drives on the Apple III are connected in a different fashion from the disk drives on the Apple II computers. The Apple III has one built-in disk drive and can support up to three external disk drives. The first external disk drive is plugged into a socket on the rear of the computer's case. The second external drive is plugged into a socket on the rear of the first external drive. The third external drive is plugged into a socket on the rear of the second external drive. Once all of the disk drives have been installed, the utilities disk should be used to configure the system. The internal disk drive is addressed as .D1. The first external drive is addressed as .D2 and so on up to the third external disk drive, which is .D4.

In CP/M, disk drives are addressed by letters. The system is usually booted on drive A. When it comes up, a system prompt appears on screen which indicates the current disk drive. This prompt is "A>." To view the directory of the disk in this disk drive you would type DIR. To view the directory of a disk in drive B ou would type DIR B: after the prompt. To access a program or file on a disk in drive B you would type B: followed by the program name or file name.

Disk Drive Utility Software* There are many programs available to improve the disk drive, disk operating system, or other parts of the read/write operation. Some will improve the transfer of information while others will gauge the speed and condition of the system. The programs listed below perform similar functions, but further investigation will be needed to satisfy particular utility needs.

Disk Drive Utility Software

	PROGRAM	VENDOR
	Amper-Reader	Alan G. Hill Software
	Amper-Reader II	Alan G. Hill Software
	B-Copy	Pygmy Programming
	Back It Up II	Sensible Software
	Catalog Sorter	Howard Software Services
	COMpress	Digital Marketing
	Control Program	Optimized Systems Software
	Copy][Plus 4.0	Central Point Software, Inc.
	CP/M Fast Disk Software	Legend Industries, Ltd.
	DARK—The Disk Repair Kit	Datacope
	Datacope Text File Copy	Datacope
	Directory Manager	Synergistic Software
	Directory Master	Micro-Sparc, Inc.

Disk Drive Utility Software (continued)

PROGRAM	VENDOR
Disc-O-Doc	M.D. Software, Inc.
Disk-Dater	Thunderware, Inc.
Disk Doctor	Sensational Software
Disk Doctor	Supersoft Associates
Disk Drive Timer	Disco-Tech
Disk Emulator	Legend Industries, Ltd.
Disk Fixer	Image Products, Inc.
Disk Fixer Monitor Extender	Image Products, Inc.
Disk Organizer	Sensational Software
Disk Organizer II	Sensible Software
Disk-O-Tape	Dan McCreary
Disk Prep	Sympathetic Software
Disk Recovery	Sensible Software
Disk Text Editor Edit II	Services Unique, Inc.
Disk Utility Menu	Matrix Software
Disk Utilities 3.0	Ongoing Ideas
Disk Zap	Steketee Educational Software
DOS Boss	Beagle Bros Micro Software
DOS Customizer	Instant Software
DOS Dater	Thunderware, Inc.
DOS Enhancer, The (TDE)	Chriswalt Publications, Inc.
DOS Mover For 64K Apple	Simulation Software
DOS Plus	Sensible Software
DOS 3.3	Apple Computer, Inc.
DOS 3.3 Utilities	Rocky Mountain Software
DOSource 3.3	Lazer Systems
Double DOS	Telephone Software
Dual DOS ROMs	Soft Control Systems
File Compare	GAF Software
File Maker	A. B. Buscaglia
Filer, The	Central Point Software, Inc.
Flex DOS	Norell Data Systems
GAF Utility Package 1	GAF Software
GAF Utility Package 2	GAF Software
High Speed Init.	Indian Head Software
Lock-It-Up 4.1	Double Gold Software
Manipulator, The	Pear Software
Masterdisk	Masterworks Software, Inc.
Masterdisk Disk Utility	Masterworks Software, Inc.
MasterDOS—DOS Customizing Disk	Masterworks Software, Inc.
Memory Master 1.1	Legend Industries, Ltd.
Menu Assortment	Wallace Micro Mart
Menu Generator (Disk Organizing System)	Crane Software, Inc.
Multi-Disk Catalog III	Sensible Software
Multiboot Upgrade	Western Microdata Enterprises

Disk Drive Utility Software (continued)

PROGRAM	VENDOR
Nibbles Away II	Sherman Electronics
Ongoing Ideas Disk Utilities 2.1	Ongoing Ideas
Original Quickloaders	Sensible Software
O.S. Converter	Dynamic Microprocessor Assoc.
OS/A+	Optimized Systems Software
Pascal Soft-Disk Emulator	Great Lakes Digital Resources
Pascal Soft Disk Emulator	Legend Industries, Ltd.
Pig-DOS	The Big Pig Software Company
Pseudodisk: A Disk Simulator For Integer BASIC	Hayden Book Company
Single Disk Copy	Computer Stations, Inc.
Super Emulation Software	Legend Industries, Ltd.
Super Disk Copy III	Sensible Software
Track & Sector List	Softagon, Inc.
Ultra Fast Copy	Computer-Advanced Ideas
Universal Boot Initial Initializer	S & H Software
Utilities Disk, The	California School for the Deaf

Disk Drives, Apple-Compatible Several manufacturers of 5 ¼ inch full-size and half-high disk drives make disk drives which are compatible with various Apple computers. Manufacturers of 3+ inch disk drives also manufacture Apple-compatible disk drives. A listing of Apple-compatible disk drives is presented below along with their capacity and the compatible machine.

MANUFACTURER	MODEL	CAPACITY	COMPUTER
Aerocamp P.O. Box 24829 Dallas, TX	40 Track	N/A	II, II+, IIe
Amdek 2201 Lively Elk Grove Vill., Il.	Amdisk I	286K	II, II+,IIe
Apple Computer, Inc. 20525 Mariani Cupertino, CA	Disk II	140K	II, II+, IIe
	Disk III	140K	III
	Unifile	871K	III
	Duofile (2 Unifiles)		III
Franklin Comp Prod 741 Alexander Rd Cherry Hill, NJ	Franklin 10	140K	II, II+, IIe
Micro Sci 21585 Hathaway Santa Ana, CA	A-2	140K	II, II+,
	A-40	171K	II, II+, IIe
	A-70	286K	II, II+, IIe
	A-3	140K	III
	A-73	286K	III
	A-143	572K	III
RGB Designs 3375 Woodward Santa Clara, CA	Taur II	140K	II, II+, IIe
	Taur II+	171K	II, II+, IIe
	Mini Taur	140K HH	II, II+, IIe
Rana Systems 21300 Superior Chatsworth, CA	Elite One	163K	II, II+, IIe
	Elite Two	326K	II, II+, IIe
	Elite Three	652K	II, II+, IIe
Vista 13137 E. Edinger Santa Ana, CA	Solo	140K	II, II+, IIe

Disk Ephemerides* Calculates ephemerides for all time periods past and future with an accuracy of no less than a second of an arc. Will contain all information of use to a variety of astrological methods. Matrix Software.

Disk File A file residing on a disk. Also used to refer to the complete disk drive.

Disk Library* A program that allows you to keep track of the programs and files on each disk in your library of disks. The program automatically enters the catalog of any DOS 3.1, DOS 3.2, or DOS 3.3 disk onto a data diskette which has been set up to handle disk library files. The program requires an Apple II or Apple II+ with at least one DOS 3.3 disk drive and 48K of RAM. The menu allows you to select a review and edit option, a file manager option, an add entries option, a sort files option, a file summary option, a block actions option, or a library report option.

This flexible program allows you to store up to 1200 records on a data diskette; it also provides you with a very convenient method of managing your disk library. You can catalog all sorts of disks, including those disks which contain CP/M and Pascal files and programs. This is the perfect program for anyone with a large, unorganized collection of disks; they may be organized very quickly with this program. Southwestern Data Systems.

Disk Logbook* A system for logging radio contacts. It will also print the log, print the OSL card for contact verification, QSL tracking and award status tracking for many awards. Twenty stations can be in QSO at the same time. 32K or 48K with ROM Applesoft or 64K with RAM Applesoft. Smart Ware.

Disk Mailing List* This mailing list program has all the essentials you need to manage your mailing files. Add, change, or delete entries, sort on key fields, search for all occurrences of a last name. Spacing between labels is variable and automatic or multiple copies of the list is optional. Program supports either serial or Apple parallel interfaces. 16K. Criterion System Games.

Disk Operating System The disk operating system most commonly used on the Apple II, II+, and IIe computers is DOS 3.3. The system is loaded into the computer's memory by inserting the DOS 3.3. System Master Diskette into disk drive number 1 and turning the computer on. If the computer is already running, but DOS has not been booted, the user can type IN # or PR# followed by the number of the slot which contains the disk drive controller card for the drive which holds the System Master Diskette. Once the operating system has been loaded, this diskette can be removed from the disk drive and put away in a safe place.

The computer now holds a collection of Machine language routines and commands which allow it to transfer data and programs from the computer's memory to storage on disk and to reverse this process. This collection of programs makes up the disk operating system (DOS).

DOS 3.3 is configured to utilize 35 concentric tracks on one side of each 5 ¼" disk. Each track is divided into 16 sectors; each sector can hold 256 bytes of data. Thus, each diskette should be able to hold 143,360 bytes or 143K bytes of data. In practice, the user can access less than this amount of storage space. The storage space is lost to the disk operating system if it is stored on the diskette and to directory and reference tracks which are needed by the disk operating system.

Each diskette must be configured for use by DOS, initialized or formatted. The initialization process in DOS 3.3 is accomplished with the INIT command. This command causes the computer to transfer DOS from memory to the two outer tracks on a disk. It also saves any program currently in memory. Most computer users write a short program called HELLO. Often this program will display on screen a description of the files or programs on the disk. Initialization also places a directory track on the disk. A disk initialized as described above is called a "Slave Diskette" since DOS must be in the computer's memory to use all of the DOS commands with this diskette. Such a disk may be converted to a Master Diskette which contains the "DOS Image" by using BRUN, MASTER CREATE from the System Master Diskette.

Once a disk has been initialized, the disk operating system can use it for data storage and retrieval. The storage process is begun by the SAVE or BSAVE command followed by the file or program name and the optional slot, drive, and volume designators. DOS moves 256K of information from RAM to a particular area of RAM called the file buffer. The operating system waits for the buffer to fill completely or for information to stop flowing to the buffer. As soon as either of these incidents occur, DOS seeks an unused sector on the disk and writes the information contained in the buffer into the first unused sector found. As this writing process is occurring, DOS moves another 256K of information into the buffer. As soon as the buffer fills again or information flow ceases, DOS looks for another free sector on the disk (it can be anywhere on the disk rather than in a consecutive sector on the same track) and writes the buffer's contents into this sector. As DOS is storing data or programs in sectors on the disk, it creates a track/sector list which is a record of which sectors have been used to store the information associated with the file name being saved. The track/sector list contains all of the pertinent information about where a particular program or file is stored on disk including whether it occupies one or more sectors, the manner unassigned, and an end of file indicator. When writing is completed, the track/sector list is stored in an unused sector on the diskette. As soon as the track/-sector list has been stored, DOS updates the disk's directory track (track $11) and the disk's bit map. The directory entry includes file name, file type, file length in sectors, and location of the directory track on a disk which contains the disk's Volume Table Of Contents. The VTOC contains the track and sector number of the first directory sector, the DOS release number, the Disk Volume Number, the maximum number of available track/sector pairs in each sector of a track/sector list, number of diskette tracks, number of diskette sectors, number of low bytes per sector, number of high bytes per sector, and a bit map of the disk. The bit map is a symbolic representation of the space occupied in sectors on a disk and the condition of that space. Certain utility programs display this electronic map of the disk on screen in low-resolution graphics.

Reading files, programs, and data from disk into the computer's memory is accomplished with LOAD or BLOAD commands followed by a file name. DOS begins the loading process by first reading the directory track until the entry for the desired file name is found. DOS moves to the track/sector list and reads it until the first track/sector pair of the file has been read. DOS then begins to load the file and returns to the track/sector list as necessary to load subsequent sectors until the file has been loaded.

Thus, DOS is the program or collection of programs which allows the computer to properly manage information storage and retrieval on magnetic media such as disks or hard disks.

Disk Organizer* Customizes your disk catalog. This utility allows you to alphabetize and rearrange files in your catalog, recover deleted files, purge deleted file names, rename files with normally illegal characters to produce inverse or FLASHing characters. 48K. Sensible Software.

Disk Prep* Tests disks for flaws (bad sectors are bypassed so they can't be used), formats disks, and doubles the storage capacity on your disks by using the reverse side. Sympathetic Software.

Disk Text Editor Edit-II* An improved version of the DOS Text Editor. Change disk files, BASIC programs, lists, EXEC files, and reports. You can work on single records or blocks: add, change, delete, insert, print, display, copy, or restore. Handles upper and lower case output. An easy-to-use package with a thorough tutorial on disk operation, file organization, and how to use the program. Services Unique, Inc.

Disk Utility Pack* Some of the features of this handy package are: the latest DOS, Applesoft CHAIN to link programs together, renumber/merge, and more. Also includes a manual with examples and helpful user information. Apple Computer, Inc.

Diskette Magnetic recording medium which resembles recording tape but is shaped like a phonograph record and is encased in a plastic or paper cover which is lined with non-abrasive material treated with lubricants. Diskettes are used to store data, files, and programs. They are manufactured in 5 ¼″ and 8″ diameters. Diskettes are single-sided if only one side is used to store information. This is the underside of the disk as it is placed in the disk drive. They are single-density disks if they are intended to store data in a 24 tracks-per-inch format. Diskettes which are manufactured to store information on both sides are double-sided disks. Diskettes which are intended to store data in a 48 tracks-per-inch format are double-density disks. Disks which are formatted into sectors by the disk operating system are soft-sectored. Those which have reference holes at a number of points on the disk are hard-sectored.

Diskette—Backup Because diskettes can be rendered unreadable by physical damage, magnetic contamination, or dirt, it is wise to keep at least two copies of any important information. Any copy program provided with DOS may be used to make such copies of disks which are not copy protected. Backups of copy protected program disks should be obtained from the manufacturer.

Diskette—Bad Sector A sector on the diskette which will not read/write data correctly. Usually due to a minor physical flaw in the diskette. One or two bad sectors will not seriously effect the diskette's use—DOS will mark them as bad and avoid using them. More than a few bad sectors indicates the diskette should be used as a frisbee rather than to hold your valuable data.

Diskette—Free Space Apple DOS 3.3 provides a program called FID on the System Master Disk. This program is written in Machine language and can be run by entering BRUN FID followed by RETURN. This program displays a menu which allows the user to select one of the following routines: copy a file, catalog the diskette, reset slot and drive, lock a file, unlock a file, verify a file, delete a file, and display used and unused sectors on a diskette. All of these routines are useful to anyone who is copying material file by file from one disk to another.

The STAT command in CP/M provides the user with pertinent statistics about each file on a diskette and also returns the number of bytes remaining for storage on a disk. To access this information the user must enter:

STAT B:

for the disk on Drive B or

STAT

followed by RETURN for the disk on Drive A.

Diskette—Listing Files In DOS 3.3 the CATALOG command will cause the computer to read the directory of a disk and to display a list of the files and programs on the disk. This command also identifies the file type (B = Binary, T = Text, I = Integer, A = Applesoft) and the number of sectors used by each file or program. A typical listing would look like the catalog shown below. This listing is the catalog from the Apple DOS 3.3 System Master Diskette.

```
         DISK VOLUME 254
 * A 006 HELLO
 * I 018 ANIMALS
 * I 003 APPLE PROMS
 * I 006 APPLESOFT
 * I 026 APPLEVISION
 * I 017 BIORHYTHM
 * B 010 BOOT 13
 * A 006 BRIAN'S THEME
 * B 003 CHAIN
 * I 009 COLOR DEMO
 * A 009 COLOR DEMOSOFT
 * I 009 COPY
 * B 003 COPY.OBJ
 * A 009 COPYA
 * A 010 EXEC DEMO
 * B 020 FID
 * B 050 FPBASIC
 * B 050 INTBASIC
 * A 028 LITTLE BRICK OUT
 * A 003 MAKE TEXT
 * B 009 MASTER CREATE
 * B 027 MUFFIN
 * A 051 PHONE LIST
 * A 010 RANDOM
 * A 013 RENUMBER
 * A 039 RENUMBER INSTRUCTIONS
 * A OO3 RETRIEVE TEXT
```

The asterisk (*) indicates that the file is locked and may not be deleted or written to until it is unlocked.

In CP/M the DIR command is used to display all of the files on a disk or all of the files with a particular extension (.COM, .BAK, etc.). See DIR.

Diskette—Listing of Files CP/M Use of DIR. If you are in CP/M (prompt is A> or B>), for the default diskette drive enter:

DIR

For diskette B enter:

DIR B:

If you are in BASIC, use

FILES
or
FILES B:

These routines are useful to find a program on file, if you are unsure of the exact spelling of its name. If you still cannot identify your program from DIR listings of all diskettes, you may have to load and list likely-looking candidates until you find it. This underlines the usefulness of mnemonic file names that remind you of the contents of a file. A REM at the start of each BASIC program to identify it when listed is also recommended. Invisible files will not appear in the directory display. See DIR.

Diskette—Load Instructions In DOS 3.3 any Applesoft BASIC or Integer BASIC program may be loaded by entering:

LOAD <file name>

Any Machine language program must be loaded with the BLOAD command. Text files must be OPENed and READ.

In CP/M a text file is displayed on screen with a TYPE command, and a transient command is created with a LOAD command. A program is loaded and run by typing the program name right after the system prompt and pressing return.

Diskette—Organization See Disk Operating System.

Diskette—SAVE Instruction If you have a program named "Green Stamps" that you wish to save on a DOS 3.3 initialized disk, you would enter:

SAVE GREEN STAMPS

followed by RETURN. The computer would use the disk operating system to save this program to the current disk drive. If the program you wish to save were a binary file or Machine language program you would BSAVE the program by name and follow the name with the memory address from which the program was saved.

In CP/M if you wish to save a transient program to disk you would use SAVE, followed by the number of 256-byte elements used by the program, then the file name and the destination disk drive indicator, prior to pressing RETURN. To create a new file on a disk you would use the ED <filename> command.

Diskette, Copy or Backup Any diskettes containing important programs, your own or commercial ones, should be duplicated and stored in a safe place. Any data such as word processor files, spreadsheet files, data files, etc., which you consider important, should also be backed up. COPYA or FID on the System Master Diskette for DOS 3.3 may be used to make such copies depending upon whether you wish to copy an entire disk or just one file. DISCOPY or WASH may be used in CP/M.

Diskette, Data Any diskette dedicated to the storage of data or files as opposed to programs is called a data diskette. Such diskettes could be used by DOS, SOS, CP/M or with certain types of software such as list managers, database managers, etc.

Diskette, Default or Current Any diskette in the disk drive currently being used by the system is called the current diskette. Any diskette in the disk drive which the system seeks automatically without reference to the user is the default diskette. The parameters for selecting the default diskette may be a part of the program which is running or may have been set up in the program by the user in a configuration routine.

Diskette, Initialize Diskettes may be initialized (formatted) in DOS 3.3. by using the INIT command to save a HELLO program on an unformatted disk. Master Create, a program on the DOS 3.3 System Master Diskette places the DOS image in the HELLO program. In CP/M, DISCOPY allows blank disks to be formatted and the operating system to be loaded to a formatted disk.

Diskette, Source The diskette from which information/data is coming. Target diskette is the diskette to which information/data is going.

Diskette, System A system diskette is a diskette which contains the operating system used by the computer to communicate with disk drives and other peripherals. For DOS 3.3 this diskette is the DOS 3.3 System Master Diskette; for Apple III SOS it is the Boot Diskette. In CP/M, it is the CP/M System disk supplied with your hardware (Z-80 card). When a system disk is booted, it automatically loads the operating system into memory.

Diskette, Target The diskette to which information/data is going. Source diskette is the diskette from which information/data is coming.

Diskette, Write-Protected. A diskette is write-protected if it does not have a write-protect notch about one inch down on the right side. The notch could be missing altogether (as on the original DOS 3.3 Master System) or covered over with an adhesive tab. This blocks a small spring-loaded switch or a light beam inside the diskette drive and is sensed by DOS diskette drive programs. You will get an error message ("WRITE PROTECTED") anytime you attempt to alter a file on a write-protected diskette by changing it, deleting it, copying a file onto the write-protected diskette, or formatting the diskette.

You are allowed to use files, load them, or copy from the write-protected diskette. The purpose of these limitations is to prevent accidental loss of the only copy of programs or data. In most cases the procedure is to copy the write-protected diskette onto a notched diskette, put away the write-protected diskette as a permanent copy, then modify the notched diskette. In some cases, you will remove the adhesive tab from the write-protect notch (after thinking it over) and proceed to change the diskette.

It is a good practice to put an adhesive tab (supplied with boxes of diskettes) over the write-protect notch of any important diskette you will backup. Then if you accidentally ask for the backup in the wrong direction (from the old diskette to your important diskette), you will get a second chance to make the backup rather than losing your data.

Diskette Directory DOS 3.3 uses track $11 as a directory. This track is dedicated to the storage of pertinent information about each file stored on the disk. For each file, it contains the file name, file type, the file length in sectors, the location of the file's track/sector list, and a bit map record of the file's location in terms of track/sector pairs. The directory is accessed with the CATALOG command in DOS. See also VTOC.

Diskette Directory—Apple III The Directory of a disk which holds Apple III SOS files can be read by using the File Handling Command Menu (Filer) which is on the utilities disk supplied with an Apple III system. After this disk has been booted, it can be removed, and the disk which is to be catalogued can be placed in the built-in disk drive. The File Handling Commands option is then selected from the Main Menu. Once this menu is displayed, the List Files option is selected by the user. This option lists the files on the specified device to the level selected by the user when the program executes.

Diskette Directory—CP/M See DIR.

Diskette Drive A diskette drive (or disk drive) is the machine installed in or attached to the Apple which turns the diskette, transferring data from the diskette to the Apple and vice versa. The diskette is the removable media, about the size of a square greeting card. See Disk Drive.

Diskette Format The table presented below represents the typical format that a number of disk drives, which are available for Apple computers, can set up on the disks used by the system.

The Apple Disk II System* is a single-sided, single-density. There are a number of DOS enhancement programs available which will slightly increase this capacity.

The Rana Elite One* system is a single-sided, single-density, but it employs 5 more tracks than the Disk II System. The Rana Elite Two* is single-sided, double-density. The Rana Elite Three* is a double-sided, double-density system.

Diskette Maintenance Diskette maintenance or file management are terms describing keeping track of files on diskettes. This includes creating them, finding them by name, ensuring that adequate free space is available on the diskette, maintaining backups, and deleting files no longer needed. These functions are supported by the various DOS utilities, but require thoughtful planning to insure proper results.

Some database management systems attempt to automate part of the work of keeping track of files and diskettes; some even maintain files of control and tracking data and may provide alternatives to DOS functions.

Diskette Maps The volume table of contents of every DOS 3.3 initialized disk contains a bit map which indicates to DOS which sectors are used and which sectors are unused on each track of the diskette. A number of public domain and commercial utility programs are available to display the bit map on screen for the user.

Diskette Storage Capacity and Format See Diskette Format.

Disk-O-Check* Turn your electronic check register into a budgeting system. As you enter checks, this program categorizes them by expense classification. A detailed summary can be generated for each category, so you know how and where your money was spent. This is an easy-to-use program requiring no previous computer experience. 48K; printer optional. High Technology, Inc.

Dispatcher, The* This serial interface will enable your Apple computer to connect to letter quality printers, modems, other computers, or any other device which requires serial input or output. You can choose from any of the seven baud rates available (from 110 to 19,200 baud). The Dispatcher includes the interface card, cable, and user's manual. Advanced Logic Systems.

Display A computer output device which displays graphic and/or alphanumeric information, such as a CRT or a seven-segment LED.

Display Board* With this display board you can display the address bus, trouble shoot by checking shorted address or data lines, and more. All LEDs are high efficiency types and all lines are buffered. Applied Engineering.

Display Buffers The Apple III graphics driver in most cases sets up a display in a display buffer prior

Diskette Format	Apple Disk II	Apple Disk III	Rana Elite One	Rana Elite Two	Rana Elite Three
Operating System	DOS 3.3	SOS	Enhanced DOS	Enhanced DOS	Enhanced DOS
No. of tracks per disk	35	35	40	80	160
No. of sectors per track	16	16	16	16	16
No. of sectors per disk	560	560	640	1280	2560
No. of bytes per sector	256	256	256	256	256
No. of bytes per track	4096	4096	4096	4096	4096
No. of bytes per disk	143,360	143,360	163,840	327,680	655,360
No. of tracks for DOS	4	4	4	5	5
No. of sectors for DOS	64	64	64	80	80
No. of bytes for DOS	16,384	16,384	16,384	20,480	20,480
Remaining bytes	126,976	126,976	147,456	307,200	634,880

to running the display on screen. This buffer is a section of memory which contains a location for each dot on the graphics screen. The buffer stores the designated color for each screen location. If you have sufficient memory capacity in your Apple III (128K), you have enough memory for all four of the graphics buffers which are available at any given time.

Display Control Characters Control characters which are used in programs as control characters rather than as their ASCII equivalents are invisible when the program is listed to screen or to printer. A number of public domain and commercial programming utility programs and editors will display these characters on the screen or on the printer for the Apple II, Apple II+, and Apple IIe computers. The Apple III computer will display the abbreviations of such keys on screen if you press CTRL-8.

Display the Contents of a File Using Type In CP/M the command TYPE instructs the computer to display the contents of a named file or a filetype on screen. The syntax for this command is:

```
TYPE <filename>
      or
TYPE*.file extension
```

Distribution Business System, The* Order Processing and Restocking Inventory are the two features of this program designed for home distributors. Inventory, taxes, and journal files are automatically updated. Reports are created for monthly taxes and delivery information. 48K; printer. Step One, Inc.

Dithertizer II Video Digitizer* Use the video camera supplied with this package to load hi-res graphics into your screen. Game paddles are required to control the intensity and contrast of the images. Computer Station.

Diversi-DOS* Written by Bill Basham. This modified DOS is capable of speeding up disk operations by factors of 2 to 5. Even with short files the access time is noticeably shorter, as shown in the following table of LOAD times.

You must boot with the disk containing Diversi-DOS to obtain these benefits, since the operating times are determined by the version of DOS resident in memory. Also included on the diskette are programs which will install a type-ahead buffer for the keyboard (allowing you to type the next command while the disk drive is operating) and a print buffer which will allow the computer to proceed to a new task while the printer is still working on previous information. The use of the printer buffer feature requires the presence of a 16K RAM card in slot #0 and a parallel printer interface in slot #1.

Diversi-DOS is compatible with Corvus hard disk drives and Corvus DOS, with 32-128K RAM cards from Saturn Systems or Legend Industries, but is not compatible with the Apple Serial Interface Card nor with the Silentype printer cad. DSR, Inc.

FILE TYPE	NUMBER OF SECTORS	NORMAL DOS	DIVERSI-DOS
Applesoft	8	3.66 sec	2.35 sec
Applesoft	13	4.55	2.54
Binary	21	7.08	3.07
Binary	129	31.73	7.43

Division* Spanish version of "Division Practice." Offers drill in division facts. The student can select the divisor. Grades two through four. 32K; Applesoft.NTS Software.

Division Facts* A math program for young students that teaches them division by challenging them with practice problems. 32K. Indian Head Software.

Division with One-Digit Divisors* Story problems, pre- and post-tests, and drills will enable students to perfect the basic principle of division. 48K RAM. Fullmer Associates.

DLC Data Link Control. Control characters in data transfer used to initiate and terminate communications as well as for error checking.

DLE Data Link Escape. Communications control characters in a data link are distinguished from data characters by the escape character that precedes them.

DMA Direct Memory Access. A method used on the Apple IIe to provide high-speed data transfers between a peripheral and the main memory. Data is exchanged at maximum memory speed. Memory can be accessed several ways. Disconnecting the MPU from the buses is accomplished by a HOLD signal, and requires tristate data and address buses. DMA is performed under the control of a Direct Memory Access Controller (DMAC). The Apple IIe has seven sets of pins for DMA, a set at each peripheral slot.

DMAC Direct Memory Access Controller. A device available as a single chip, used to automate DMA transfers. A DMAC is a specialized block-transfer processor which can take bus control away from the MPU and transfers one or more memory words. A typical DMAC can connect to four or eight devices.

DMA "C" DMA "C" is a compiler which may be used with Apple computers equipped with CP/M hardware and operating system software to convert CBASIC programs to Z-80 or 8086 Assembly language. Dynamic Microprocessor Associates.

DMM Digital Multi-Meter. A volt/ohm meter with digital readout instead of the older needle meter.

DMP Digital Plotters* Performs inexpensive, high quality plotting with ink on paper, mylar, or vellum. Examples of applications include navigation, architecture, mapping, music sheets, educational instruction, and more. A series of plotters is available from DMP-2 through DMP-7. Houston Instrument.

DOC CP/M File Extension. The extension (the one to three letters after the period) of a file name, often used to indicate the type of file. DOC (.DOC) is the file extension for a text format or document file.

Doctor Game, The Children may soon become interested in the medical profession after playing this game. The child is asked to study cases, run laboratory tests, and give diagnoses. Level of difficulty increases. 48K. Simulation Software.

DocuCalc* This utility allows the documentation of equations in either regular or advanced version VisiCalc*. The screen display is in 40 columns, but the program will analyze your template to determine if output is either to the screen or a printer; if you desire the entire template to be analyzed, the printer output is strongly recommended. You may use a VisiCalc-type set-up string to specify printer options. With an Epson printer, the first character in the DocuCalc set-up string must be present to suppress the extra line feed or all reports will be double spaced. The output may be a grid, like your template, with labels and data entry just as entered, and with formulas either in place (if short) or at the end of the listing (if long), or may have a single cell per line, in which case the attribute will be printed out in words. For example, /F$ is dispayed as two decimal, /FI as Integer, etc. The template contains approximately 3,000 active cells and requires a little over one hour to print. The program automatically skips page perforations, and prints the name of the template and the page number at the top of each page. A valuable feature is that at the end of the entire printout, a list of circular and forward references is printed. Micro Decision Systems.

DO-Loop A feature of a high-level language (e.g., FORTRAN) which allows a segment of a program to be executed repeatedly until a certain logical or arithmetic condition is fulfilled.

Domino De Palabras* Exercises with twelve common English word families. Definitions are in Spanish. Grade levels two through five. 32K; Applesoft. NTS Software.

Doremi* Helpful for training the beginning ear, Doremi teaches the music student to identify individual degrees of a major scale using scale degree or solfeggio responses. 48K. Micro Music, Inc.

DOS See Disk Operating System.

DOS, Booting DOS can be loaded into the computer's memory in several different ways. On the Apple II+, and Apple IIe computers it can be cold booted by inserting the DOS 3.3 System Master Diskette into drive number 1 and turning on the computer. An Apple II computer with the Autostart ROM can be booted in the same fashion. The Apple III requires the loading of the Boot Diskette.

DOS may be booted from the monitor by typing C600G followed by return. The System Master Disk must be in Drive 1, Slot 6 for this to work. CTRL-K and CTRL-P may also be used from the monitor to boot DOS. The slot number of the disk drive which contains the System Master Diskette must precede either of these monitor commands. DOS may be booted from Integer BASIC and Applesoft BASIC in a warm start (computer is already on) by typing:

```
PR#
or
IN#
```

followed by the number of the slot which contains the controller card of the disk drive containing the System Master Diskette.

DOS Command Delimiters Parameters on DOS commands can be delimited (separated) by any of these characters: space, comma, semicolon, equal sign, or tab key. In a file name, the ":" and "." are specified to delimit drive name and extension, respectively.

DOS Commands Commands are used by DOS to communicate and execute disk storage instructions given directly by the user or given by a program. These commands and a brief description of their functions are listed below.

COMMAND	FILE TYPES WHICH USE COMMAND	FUNCTION
APPEND	Sequential Text	Adds data to the end of this type of file.
BLOAD	Machine language or Binary	Loads binary file or Machine language program.
BRUN	Machine language or Binary	Runs Machine language program.
BSAVE	Machine language or Binary	Saves binary file or Machine language program.
CHAIN	Integer BASIC	Runs new program/file without clearing.
CLOSE	Sequential & Random Access Text	Closes one or more open files.
DELETE	All	Deletes file name from directory and clears flags.
EXEC	Sequential Text	Treats sequential file fields as keyboard input.
INIT	Integer BASIC and Applesoft BASIC	Formats blank disks.
LOAD	Integer BASIC and Applesoft BASIC	Loads programs from disk.
LOCK	All	Write-protects and delete protects files.
OPEN	Machine language/Binary Sequential Text and Random Access Text	Opens file and allocates buffer prior to read.
POSITION	Sequential Text and Random Access Text	Reads from or writes to specified field.
READ	Sequential Text	Read current file into memory.
RENAME	All	Give file new name in directory.
RUN	Integer BASIC and Applesoft BASIC	Load and run a program or run an already loaded program.
SAVE	Integer BASIC and Applesoft BASIC	Save current file to disk.
UNLOCK	All	Deprotect locked file.
VERIFY	All	Checks file just saved.
WRITE	Sequential Text and Random Access Text	Writes data to open file.
FP	Integer BASIC	Run Applesoft BASIC.
INT	Applesoft BASIC	Run Integer BASIC.
MAXFILES	Integer BASIC and Applesoft BASIC	Reserves buffers for input or output.
MON	Integer BASIC and Applesoft BASIC	Display input or output to screen.
NOMON	Integer BASIC and Applesoft BASIC	Stop input or output display.

DOS—Memory Required DOS 3.3 is always loaded from disk into the highest available memory location in your computer. It occupies about 8K of space.

DOS Prompt—CP/M In CP/M a prompt appears on the screen to designate which disk drive is currently in use. If A> is displayed on screen, the drive currently in use is drive A. If B> is on screen, it is drive B.

DOS Switch, The* This little switch will allow you to boot DOS by just flipping a switch. Installs easily with no soldering. Computer Micro Works, Inc.

DOS Toolkit* A product sold by Apple Computer, Inc. which supplies the user or programmer with powerful programming aids for Assembly language, graphics, and Applesoft BASIC. Disk contains an Editor/Assembler, a hi-res character generator, a character editor, and an Applesoft Programmer's Assistant. The Editor/Assembler gives the user the ability to edit and/or assemble 6502 Assembly language programs. It can store and retrieve text files, convert source files into object files, and offers the user three output choices. These are relocatable output, absolute output, and a relocating loader.

The hi-res character generator displays text on the graphics screen, provides lower case display, provides alternate character sets, allows text wrap around in the text window, and gives the user a figure animation tool.

ANAMATRIX is a character editor program which allows the user to design character sets and other graphics figures.

The Applesoft Programmers Assistant is an Assembly language programming aid which allows the Applesoft programmer to determine program length, to merge programs, renumber lines with merging, number lines automatically, display non-visible characters in program listings, cross-reference variables, and use underscore, backslash, and left bracket symbols. 64K; Applesoft in ROM. Apple Computer, Inc.

Dot Matrix A method of forming characters by using small dots. Usually patterns are 5 dots by 7 dots, or 7 dots by 9 dots, though for very high quality characters, patterns of 11 dots by 13 dots or more are required. Applies to displays, printers, and other output devices.

DOTAT The Apple III computer is provided with a graphics invokable module which allows the computer to communicate with the graphics driver program by using Assembly language subroutines. After the graphics driver has been opened with:

```
80 OPEN #1, "GRAFIX"
```

the module can be invoked with:

```
90 INVOKE "BGRAF.INV"
```

The example here is given in the deferrred mode, but both of these commands are available in the immediate mode. DOTAT is one of the dot plotting procedures available in this module. It instructs the computer to move its graphics cursor to a particular spot on the screen and display a dot of a specified color. For example:

```
WHITE % = 15
PERFORM PENCOLOR (% White %)
PERFORM DOTAT (% 50, % 160)
```

The color is prescibed in the first line. The color plot instruction appears in the second line. The dot plot is prescribed in the last line at the screen point where V = 50 and Y = 160.

DOTREL DOTREL is a dot plotting procedure similar to DOTAT in the Apple III computer's graphics invokable module. This command moves the cursor to a new screen location relative to its current location and plots a dot in the current color. For example:

```
WHITE % = 15
PERFORM PENCOLOR (% White %)
PERFORM DOTREL (%-50, % 25)
```

The first two lines establish color of the plotting pen. The third line instructs the computer to plot a point of the designated color at a point located -50 points (50 points to the left) on the horizontal and +25 (25 points down) on the vertical axis. A +50 on the X axis would move the point to the right fifty positions. (No sign in front of a number is the same as a plus). A -25 on the Y axis would move the cursor up twenty-five points.

Double Booter ROM* This add-on chip plugs into the D8 socket of the motherboard or into the Integer ROM card and provides you with a 13-sector boot without BASIC. Micro-Ware Distributing, Inc.

Double DOS Plus* This is a board that fits piggyback on the disk controller card to enable the user to switch from DOS 3.3 to DOS 3.2. No soldering is required as the board just plugs onto the controller card. A full 90-day warranty is included. Micro-Ware Distributing, Inc.

Double-Density The techniques used to store data at double bit density on a magnetic storage medium, such as MFM, M2FM. It is a disk format which uses 48 tracks-per-inch for storage rather than the 24-tracks-per-inch used in the single density format.

Double-Density Diskettes These diskettes are made in a fashion which allows data to be stored on 48 tracks-per-inch rather than the conventional 24 tracks-per-inch. On the Rana Elite Two* system, the use of double-density disks gives the user 327,680 maximum bytes prior to storing DOS and 307,200 bytes of storage after loading DOS.

Double-Sided Disk or Diskette A type of disk with both surfaces (sides) used for data storage.

Double-Sided Drives These disk drives have read/-write heads installed so the underside of a disk and the upper side can be written to or read from simultaneously. The Rana Elite Three* disk drive is a double-sided double-density drive. It gives the user 655,360K of maximum storage prior to saving DOS onto the disk and 634,880K of storage after DOS is installed on the disk.

Double-Strike Format Dot Matrix printers offer the user a variety of type formats. These formats are accessible from programs as "Escape Codes" which are preceded by the ASCII character for Escape. This character is CHR$ (27). On the Epson MX-80 printer, the escape code for double-striking is:

```
CHR$ (27) + ESCape-G
        or
CHR$(27) + CHR$ (71)
```

It can be turned off with:

```
ESCape-H
   or
CHR$ (72)
```

Double-striking produces a denser, more readable type by making two passes for each letter. Prior to making the second pass, the paper is advanced 1/216th of an inch to allow spaces between the originally printed dots to be filled. Refer to your dot matrix printer manual to use this format.

Double-Width Type Format The Epson MX-80 printer, like many other dot matrix printers, uses escape characters to change type format. The

"Escape Code" for double width printing is:

CHR$ (14)

in ASCII. This format is available from the normal print size and the compressed print format on the Epson. The printer changes back to normal or compressed print at the end of any line containing the double-width formatting code. Refer to your Dot Matrix Printer Manual for its method of providing double-width type.

Doubletime Printer* A system containing an F8-ROM chip, a plug-in interrrupt card, and a program called Doubletime Printer. The F8-ROM chip is plugged into a socket on the Apple computer's motherboard, or onto the Apple Language Card if this particular memory expansion system is used. All other memory expansion cards require that the ROM installation be made on the motherboard.

Once the hardware installation and software configuration have been completed, per the very complete instructions in the program documentation, you should read the rest of the manual. If you intend to program in BASIC and then print program listings while you continue to program, Doubletime Printer can be booted directly, and the Main Menu option "Exit to BASIC" can be selected. Doubletime Printer will then remain in memory and may be used to print out program listings while programming continues. If another program (such as a word processor) will be running, then Doubletime Loader should be BRUN instead of being booted from Applesoft. The word processor then can be booted after Doubletime Printer is in place in the computer's memory.

Doubletime Printer may be used by Applewriter, but Applewriter must be modified to reserve enough memory space by using the Applewriter Mod Exec file (which is included with the program). Doubletime Printer may be used with Hayden's Pie Writer* by configuring it in the transparent mode and then transferring the Doubletime Printer file from the program diskette to the Pie Writer diskette. Pie Writer will then use the Doubletime Printer commands directly as it is running. As a spooling system, Doubletime Printer is a viable alternative to a printer buffer. You should consult the manufacturer, Southwestern Data Systems, if you have a question concerning the compatibility of this system with your favorite programs. Southwestern Data Systems.

Dow Jones News & Quotes Reporter* A service that acts as a business researcher, stock ticker, and library, all in one. It enables you to scan the headlines of the major business newspapers, then display the story, and quickly obtain a printed copy if you want one. The program also makes over 6,000 companies' stock quotations available—yesterday's closing, today's opening, high/low, and volume traded. Play the market with the advantage of up-to-date information. Apple Computer, Inc.

Dow Jones News & Quotes Reporter* A business software package that lets the businessperson retrieve stock market information and news. The program can also be modified to work with other programs in creating portfolios. Features: News Retrieval Service, Stock Quote Service, and Customizing Features. 48K; disk. Requires modem, interface card, video monitor or TV, telephone, and a printer. Dow Jones Information Services.

Dow Jones Portfolio Evaluator* A program to store and update up to 100 stock portfolios. You computer will rapidly calculate gains or losses on your actual stock holdings, on stocks you are interested in purchasing, or on your "dream portfolio." In conjunction with the Dow Jones News/Retrieval Service, this system will do all the necessary "housekeeping" chores, such as cataloguing, calculations, etc., and provide you with up-to-the-minute information. You will have more time for research and in-depth analysis. Apple Computer, Inc.

Down Arrow (↓) The Apple IIe and Apple III computer keyboards are equipped with a "down arrow" key. This key moves the cursor down one line while editing and is used by such programs as VisiCalc* to move the cursor down.

Down One Space The CALL-922 can be used on the Apple II, Apple II+, and Apple IIe computers to move the cursor down one space. The down arrow may be used on the Apple IIe and Apple III computers. ESCape-M and ESCape-C accomplish the same thing.

Download Character Set The control code 16 of the Apple III console driver downloads a new character set into the Apple III Video Generator.

Download-MA* Designed for those interested in the stock market. Quotes may be displayed daily or weekly. Data can be edited, deleted, printed, or saved. Stock Market Software, Inc.

DP Data Processing.

DPDT Double Pole Double Throw switch. A two-polarity switch with two different "on" positions.

DPM Digital Panel Meter.

DPSK Digital Phase Shift Keying. Encoding digital data with phase differences on a carrier. See Phase.

DPST Double Pole Single Throw switch. A two-polarity switch with one on position.

Dr. Memory* A disk-based word processor that includes all the functions of dedicated word processors. Muse Software.

DRAW The DRAW command is used in Applesoft high-resolution graphics mode to draw a figure specified by its number (1 to 255) from the shape table currently in memory and plot this figure on the screen.

DRAWBLOCK The Apple III graphics driver uses a DRAWBLOCK operation to draw an entire predefined shape at a point on the screen below and to the right of the current cursor position. It requires the block address, bytes per row, column bit displacement, row displacement, block pixel width, and block pixel height to operate. Due to the nature of the addressing system used (two byte) you should consult graphics instructions for the language you are using on the Apple III.

DRAWIMAGE The Apple III graphics-invokable module uses the DRAWIMAGE procedure in a fashion similar to that of the DRAWBLOCK procedure of the graphics driver. This procedure requires six arguments expressed in integers. The first argument points to the first element in an array containing the block of bits to be plotted. The second argument presents the number of bytes in each row of the block to be drawn. The third argument defines the number of bits to be skipped in each row prior to transferring the block. The fourth argument determines the number of rows of bits to be skipped prior to transferring the block. The fifth argument determines the width in bits of the block. The sixth determines the height in bits of the block to be drawn.

DRAWLINE The Apple III graphics driver uses code 24 to instruct the computer to draw a line from the cursor's present position to another specified position on the screen. The destination point of the line must be specified as a two-byte X-coordinate and a two-byte Y-coordinate.

Dressmaker's Dummy* A dressmaker's helper. This program will estimate amounts of material and notions needed to realize one of your creations. It also can adapt designs to various sizes and print out patterns. Both professionals and students will find this an excellent aid. A hi-res program, programmed with light pen. Frank Salvage.

Drill II* Four programs for students to increase spelling, adding, subtracting, and multiplying skills. Six programs for the teacher to help record individual progress, exercises, attendance, and more. 32K. Teck Associates,

Drive A mechanical and electrical/electronic device which operates a tape transport or a floppy disk. It may include several motors for rotation, head positioning, etc., as well as position sensors, control circuits, lights, and switches.

Drive Emulators Bank switching and the production of large memory expansion cards has given rise to some of these memory expansion cards being used as disk drive emulators. They are designed to load every thing on a disk, interact with a disk drive, then down load everything in memory to the disk. A number of such boards are available. Among them is a Prometheus Expand-A-RAM in 64K to 512K; Saturn Systems' RAM expansion products, Sorrento Valley Associates, App-L-Cache with capacity from 64K to 256K; and Legend Industries' 128K de soft disk, and their 64K de emulator are examples of this type of hardware.

Drive Letter and File Name A CP/M file name is one to eight characters in length. It may be preceeded by an optional drive letter (separated by a colon). Also, an optional one to three character file extension may follow (separated bya period). The entire specification for a file consists of the three parts:

<drive>:<filename>.<extension>

and is often called a <filespec> in documentation. Example:

A:COMMAND.COM

Valid drive letters are A (the first or leftmost drive), B (second or rightmost drive), C, and D (external or electronic drives). Additional drive letters can be used as electronic disks (q.v.) in some software systems.

Drive, Source The diskette drive from which information/data is coming. Target drive is the diskette drive to which information/data is going.

Drive, Target the diskette drive to which information/data is going. Source drive is the diskette drive from which information/data is coming.

Driver A program which allows a computer to operate a piece of hardware as directed by another program or a user. The Apple III computer uses driver files to enable the computer to communicate with the console (keyboard and screen), to use a serial printer, to use a modem, to use SOS, and to display graphics. An Apple III system must be configured by loading the proper drivers on to the system boot disk or by accessing them with the utilities disk. The Apple III can use up to 32 drivers at once if their memory requirements are small enough.

Driver Code File The Apple III computer uses two types of driver files. These are full scale peripheral drivers which provide control over peripheral devices. These files usually contain only code. The other type of driver file contains detailed system parameters as well as a code module.

Driver Parameters The Apple III device drivers are controlled and directed by driver parameters. These parameters may be edited by using the Edit Driver Parameters program or the System Configuration program on the utilities diskette. To be edited, the driver must be loaded into memory during system configuration or when needed. When you use the edit program for a particular driver, its parameters are displayed on screen for you. Any parameters which may be changed are displayed at the top of the screen. To change one, enter the parameter number and press RETURN. Then enter the new value. When all of the parameters you wish to change are completed, press ESCape.

Drives, Apple-Compatible The most common disk drives used with the Apple II, II+, and IIe computers are Apple Disk II disk drives. The Apple Disk II for the Apple III is the most common disk drive for the Apple III computer. In the time since the Apple II computer was first introduced, a large number of manufacturers have been producing disk drives which are compatible with all of the Apple computers. These disk drives are listed below.

The list represents a number of Apple compatible disk drives. There are even more out there. Just read the magazines and go to the computer shows to find them.

Drum Rotating magnetic memory, similar to disk, but using the surface of a cylinder.

DSK An abbreviation used in CP/M with the STAT command to indicate that the operating system should display the statistics of the disk on the disk drive which is alternate to the current drive.

DSKRESET In CP/M 2.2 and MP/M, the DSKRESET command is used to control disk changing in a multi-user environment. The use of this command protects other users who may be accessing data from the disk which is being changed.

DSP An Integer BASIC debugging tool which instructs the computer to display the values of selected variables as program operations are carried out.

MANUFACTURER	DRIVE NAME	CAN USE APPLE CONTROLLER	MAX CAPACITY	COMPATIBLE WITH			
				II	II+	IIe	III
Rana Systems	Elite One	Yes	163K	Y	Y	Y	
Rana Systems	Elite Two	Yes	326K	Y	Y	Y	
Rana Systems	Elite Three	Yes	652K	Y	Y	Y	
American Mitac	Mate I	Yes	163K	Y	Y	Y	
Quentin	Apple Mate	Yes	126K				Y
Micro-Sci	A 3	Yes	163K				Y
Fourth Dimension	MSM-123200	Yes	143K	Y	Y	Y	
Micro-Sci	A 70	Yes	268K	Y	Y	Y	
Micro-Sci	A 143		572K			Y	
Aero Comp	Disk Drive	Yes	163K	Y	Y	Y	
Micro-Sci	A 40	Yes	146K	Y	Y	Y	
Micro-Sci	A 2	Yes	126K	Y	Y	Y	
Micro-Sci	A 73	Yes	286K				Y

DSR Data-Set Ready (RS-232C standard). A line on a modem, indicating to the data terminal that the received carrier is normal. See RS-232C, DTR, CTS.

DTE Data Terminal Equipment. Equipment which receives or originates data; as opposed to Data Communications Equipment, which merely transmits data from one device to another.

DTL Diode Transistor Logic. A logic circuit in which input diodes drive output transistors.

DTR Data Terminal Ready (RS-232C standard). A line on a terminal indicating to the modem that it is veady to send data, See RS-232C, DSR, CTS.

Dual DOS* This is a small board that enables you to use both DOS 3.2 and 3.3 disks. It plugs onto your DOS 3.3 disk controller card and is accessed by pressing the CTRL key on your computer whenever you boot a 3.2 disk. Word-Power.

Dual Intensity A printer or display device which can reproduce symbols in bold-faced or highlighted formats, as well as regular intensity.

Dual Processors Two CPUs in one computer. Provides redundancy to increase reliability or productivity since tasks can be divided and can proceed independently. Also, a system with two different types of processors, with one active or dormant at any given time.

Dual Thermometer System* A package for temperature reading and processing applications. It includes a ROM card, two temperature probes, and software for time temperature processing. Any available slot can be used since the software recognizes the card's location. 48K. Strawberry Tree Computers.

Dual-Comm Plus* This board provides two independent serial I/O interfaces to your Apple II. One port is asynchronous, and the other is both synchronous and asynchronous. Special support is provided for printers and modems, but you may also connect other serial devices. Bit 3 Computer Corporation.

Dumb Terminal A low-cost data terminal, ordinarily a CRT, which does not have advanced features, such as editing keys or local processing.

Dummy Variable Stand-in, which will later be replaced by an actual variable name or literal value.

DUMP A CP/M command which instructs the computer to dump the contents of a named file to the console and to display them in hexadecimal notation.

Dump Transfer the contents of one memory device to another. Internal registers may be dumped to memory, memory can be dumped to disk, printer, or screen, etc.

Duplex Bidirectional communication method allowing simultaneous data transfers in both directions. May use separate lines or multiplex a single line.

Duplicate File Name Apple DOS 3.3 will write over an existing file on a disk if you save another file or program with the same name to that disk. The RENAME command could be used to give all of the files on the same disk the same name without overwriting. Just think of how confused DOS would become by trying to load a program from such a disk.

DUT Device Under Test.

DVC CP/M File Extension. The extension (the one to three letters after the period) of a file name tends to tell you what kind of file it is. DVC (.DVC) is the file extension for a device driver or configuration file for a particular device such as the Epson printer, a Centronics printer, a particular modem, etc.

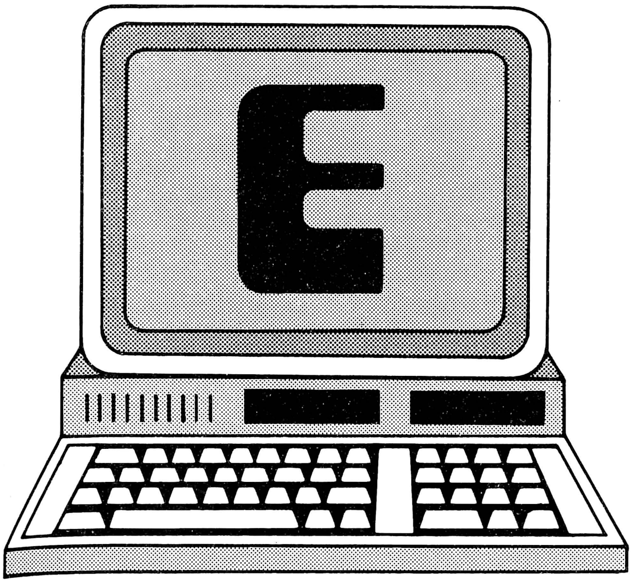
Dyadic An operation with two operands, such as addition or multiplication. Contrast to a monadic operation with one operand such as negation.

Dynamic Circuitry which stores information as charges on MOS capacitors. Usually volatile, requiring periodic refreshing.

Dynamic Hebrew Dictionary* A teaching aid, for the beginning and advanced Hebrew student, that presents 200 Hebrew nouns. The dictionary entries are in color on the screen with the English/Hebrew translations. Graphics are used to match the proper word with the picture. 48K. Institute for Computers in Jewish Life.

Dynamic Memory Random Access Memory is often called dynamic memory or volatile memory. It is a collection of chips, attached to the motherboard and its circuits. Each location in memory is accessed by the computer's microprocessor chip. The Apple II and Apple II+ computers use 4K and 16K RAM chips which are used concurrently by the 6502 microprocessor and the Video Display circuits. The 4K RAM chip used in these computers is a 4096 chip. The 16K chip is a 4116 chip.

The Apple IIe computer uses 64K RAM chips which must be multiplexed as these chips are used by programs, data storage, and video display circuits.



E Codes. ASCII = 69, HEX = 45. e—ASCII = 101, HEX = 65.

E Enable. Also: The hexadecimal symbol for the decimal number 14: E base 16 = 14 base 10 = 16 base 8 = 1110 base 2.

E In CP/M, E is an abbreviation for Echo which is an instruction to the computer to display all copy operations on the screen as they are being carried out.

e Powers of, in BASIC—Natural logarithms—see EXP.

EA Electronic Arrays.

Ear, The* Graphically represents the ear and its various parts, the inner, outer, and middle segments. Each part is paralleled by a tutorial explaining its name and operation in relation to other parts. Includes both Latin and common names and shows the action of moving parts. The program is menu-driven and questions students using a true/false format that rewards correct answers and ignores incorrect ones. 32K. Micro Power and Light Co.

Early Childhood System* The E.P.I. Retrieval System can help teachers locate many of the 5,000 programs available from hundreds of publishers. Assists with ordering of early elementary educational materials and cost justification. Features Beginning Reading, Math and Grammar Skills, and Perceptual Skills. Four disks and teacher's manual. Learning Well.

Early Civilization* A program for sixth graders that covers early Greek and Roman civilization. Teaches them information about names and places. Right On Programs.

Early Elementary I* Four programs designed for persons with limited computer experience. Features graphics, optional music reinforcement, and positive comment for correct answers. Includes: Count the Shapes, Color Match, Number Drill, and Shape Match. Also has a Teacher Management File that offers many options. Compu-Tations, Inc.

Early Elementary II* A series of programs, for early elementary students, that includes Alpha Drill, Alphabet Line, Inside Out, and Number Line. Also features personalized messages, music, and happy or sad faces that respond to answers. Teacher Management File gives program flexibility and record keeping capabilities. Compu-Tations, Inc.

Early Games for Young Children* These games are all run from a menu, which is a series of screens containing pictures representing the game. When the child sees the picture of the game she or he wants to play, pressing any key will start that game. Matching games (either numbers or letters) allow the child to find the correct key on the keyboard to match the large letter or number displayed on the screen. The numbers and letters are in two separate games to assist the child in differentiating between them. Count gets the child to count the items displayed on the screen and find the number key which corresponds. Add and Subtract are played with colored blocks—two stacks separated by a + or a - sign, and followed by an = sign. The sum is never greater than nine. As subtraction is a more difficult concept for preschoolers, it requires more patience and probably some assistance from an adult. Count, Add and Subtract all become more difficult as they are played with success.

Alphabet teaches the order of the letters; an A is displayed and the child should then press the B; if the correct key is pressed, the letter is displayed on the screen. If the wrong letter is pressed, the sequence of letters up through the one required is displayed in regular TEXT (CAPS) below the last large graphics letter; then, the child must find the correct key before the game will proceed. In Names, an adult must first enter the child's name; then, the child can practice typing his/her name with some assistance from the computer. Compare Shapes requires the child to press the number key corresponding to the numbered shape that differs from the other three.

Since these games are designed for really young children, there is no way to stop using the disk except to open the drive door and turn off the machine, so the presence of an adult is recommended. Counterpoint Software, Inc.

Earth and Its Composition, The* Introduces geological concepts, such as volcanic action, erosion, and more, to explain how the earth was formed and continues to form itself today. A game is included for testing student comprehension. Disk or cassette. Right On Programs.

EASI/ARIMA* Designed for the person who works with stocks and commodities and does not need to deal with the statistical properties of a forecast. The program allows updating of forecasts, chains programs to link Box-Jenkins steps into one procedure, selects the best model automatically, and reads Computrac databases. The Winchendon Group.

Easy Form* Calculate mathematical equations quickly and easily with Easy Form. Editing and formatting allows the user to create different business forms while saving the information on disk. Garbo Software.

EasyFiler* An information processor that can create databases for inventory, sales analysis, billing, and other records. Also lets you print reports that will give a more realistic picture of your business standing. Information Unlimited Software.

EasyMailer* When used with the Original EasyWriter, this program can produce individualized form letters for your company or small business. Besides entering names and addresses, EasyMailer can be used to enter key words into the letter. It can also address labels and envelopes. 48K; disk. Information Unlimited Software.

EasyMover* An electronic mail system that enables you to transmit your reports in a few minutes! It uses telephone lines to transmit between two Apples. It will also translate between Apple text files and EasyWriter. Consequently, EasyMover makes EasyWriter compatible with other data files like VisiCalc and DataDex. Information Unlimited Software.

EasySpeller* EasySpeller contains a dictionary of over 80,000 words and lets you create a customized exception file. Some options offered are: Replace Throughout File, Add to Exception File, and Apply Suggested Correction. Information Unlimited Software.

EasyWriter Professional* Entirely written in FORTH language, this excellent word processor incorporates a full-screen editor, file management system, and a formatter/printing interface. The mode system is simplified, but sometimes difficult to tell when insert/insert line mode is on. The editor uses a forty-column screen. There seems to be some duplicated effort in dealing with the format commands. Ease of use is the main feature of this system. 48K. Information Unlimited.

E-Beams Electron Beams.

Eccentricity Form of a Conic* For introduction and reinforcement of the definition of conic sections from an eccentricity perspective—uses Apple's graphing capabilities. Math Software.

Echo A character received from the keyboard is sent to the printer or screen for display. See Keyboard—Echo Function.

Echo—Hardware Testing A loop-back or "Echo" technique is used to test the circuits of an input/-output device by "looping" whatever is output back into the computer as if it were input. In this way, the circuits inside the computer are tested in isolation from the circuits of the external device to locate a fault.

Echo—keyboard to screen Echo describes the process of sending characters keyed on the keyboard to the screen for a visual confirmation of what has been typed. There are no hard wired connections between the keyboard and the screen. The keyboard simply enters characters into memory.

ECL Emitter Coupled Logic. This is a bipolar transistor-transistor logic (TTL) device using variations in the current, rather than voltage levels, to control bit and gate switching. While as much as ten times faster than other circuits, ECL-TTL circuits have much higher power consumption and heat production.

ECM Electronic Counter Measures. Using electronic devices to jam or evade an opponent's electronic equipment. Used in combat and espionage situations.

Econometrics Linear Forecasting (ELF) Two diskettes which present menu-driven software for statistical analysis and for fitting data. ELF can translate files to and from Data Interchange Format (DIF), translate files to and from Apple Plot format, translate files from Curve Fitter and Scientific Plotter, and to and from mainframe statistical packages. The software performs the analysis of variance on a continuous, one-way basis; the analysis of variance on a two-way basis; calculated correlation coefficients; does discriminant analysis; does factor analysis; plots a hi-res scattergram which may be stored to disk and printed with a graphics printing program; calculates and displays such univariate statistics as variance, standard deviation, standard error, minimum value, maximum value, range, sum, kurtosis, slewness, and observation count; performs a stepwise regression of the data being analyzed; and performs a t-test on means.

This particular statistical software can be used to analyze and interpret a variety of data such as traffic flow, accident statistics, populations statistics, and any data associated with time or growth. It is flexible in that it converts data from other sources, and it displays the results of an analysis in graphic form. It is easy to use and the manual is complete and clear. The Winchendon Group.

Economic Analysis Group* A package of four programs for industrial engineers. 1) Buy Versus Lease Decision lets the industrial engineer input information such as: leasing cost, initial cost, depreciation methods, rate of return for buy-versus-lease equipment decision. 2) Rate of Return Analyzer offers the industrial engineer an expected rate of return for projects he wishes to analyze. 3) Decision Tree Analysis allows the industrial engineer to describe a sequential decision by a decision tree. Includes discounting of money and probabilistic futures. 4) After Tax Cash Flow Analysis allows after tax analysis of projects involving varying lives, initial investments, interest rates, salvage rates, annual costs and annual incomes. Also takes into account straight line, sum-of-years-digits and double declining balance depreciation methods. It then reports after-tax evaluation and determines the value of the cash flow based on the company's annual rate of return. Institute of Industrial Engineers.

Economics of Corn Production* Itemizes the expenses and returns involved in corn farming, including return to capital, labor, and management as well as variable, fixed, and total cost per bushel produced. AG-COM.

ED ED is the editor program supplied with CP/M and used to create files in CP/M. ED is loaded by typing "ED" after the system prompt and then pressing RETURN. Once ED has been loaded, it must be used to establish the name of the file being created. This is done by typing the drive designator followed by:

```
ED <filename>
```

then pressing the RETURN key. An asterisk, which is the editor prompt, then appears on the screen. The following responses may be used:

The I command allows the user to insert new text into the file.

The B command places the user at the file's beginning to start data entry.

The T command tells the computer to display the contents of the file on screen.

The E command saves the file to disk under its file name and terminates the editing session.

Edge Card Connector An edge of a printed circuit board which has exposed conductors ("ways") to form an electrical connection with another board through a slot.

Edit Change Contents of a File. The contents of a CP/M file or program may be changed in a number of ways. The first method available is through the use of the ED command. Another method is to use DDT, a debugging program which allows the user to load a program into the transient program area in order to alter the program and test its operation. This utility program may also be used to edit files other than compiled programs.

Edit Buffer In CP/M the ED program uses an Edit buffer to store the contents of a file loaded from disk for editing. This buffer is a reserved area of memory space.

Edit Driver Parameters The Apple III's utilities diskette contains a System Configuration program which allows the user to properly set up the operation of his system to suit its components or to suit a particular system use. One of the menu choices in this program is Edit Driver Parameters. The selection of this option allows the user to reconfigure particular drivers to suit the characteristics of particular devices or to ensure that a driver suits the user's needs. This selection should not be made until the drivers to be reconfigured are loaded into the computer's memory. If there are a number of drivers in memory the computer will list those drivers at the top of the screen when this menu selection is made. The user then specifies which of these drivers is to be changed. Its parameters are displayed on the screen after the completion of this step. Those parameters which may be changed are displayed in the upper screen section. To change any of the parameters at the top of the screen, the user moves the cursor, with the arrow keys, to the parameter and presses RETURN. The new value of that parameter is entered and RETURN is pressed. When the user has completed the editing of parameters, he can return to the System Configuration menu by pressing ESCape.

Edit Mode When the ESCape key is pressed in combination with the A, B, C, or D keys or in combination with the I, J, K, or M keys, the Apple II, Apple II+, and Apple IIe computers enter the edit mode until any key (other than those previously mentioned) or the REPT key is pressed. This mode enables the user to move the cursor anywhere on the screen in a non-destructive fashion. If he wishes to change a character, the cursor is placed over the incorrect character and the correct character is entered. To delete a character, the cursor is placed over this character and the space bar is pressed. To insert characters, the cursor must be moved to the spot immediately to the left of the insertion. Then the ESC-D keys must be pressed to move the cursor up one space. The character or characters to be inserted should be typed in at this time. When the insertion has been typed, use the ESC-B or ESC-J keys to move the cursor to the leftmost character of the insertion. Then press ESC-C to return the cursor to the line in which the insertion is to be made and press the right arrow with or without the repeat key to copy the rest of the line into memory.

Editing In addition to the methods described in the Edit Mode entry, there are a number of other editing tools available to the Appler user. These include the left arrow key, which is a destructive backspace on all of the Apple computers; the right arrow key, which reads any character over which the cursor traverses under its control into memory; the DEL key on the Apple IIe, the CONTROL-X keys, which remove a line from a program; the ESC-E keys, which delete all characters from the cursor's position to the end of a line; the ESC-F keys, which delete all characters from the cursor's position to the end of the display screen; the ESC-SHIFT-P keys, which erase the entire screen and home the cursor; the DEL key, which deletes program lines; and the NEW key, which erases an entire program from memory. Each of these editing tools is discussed in its individual entry in this encyclopedia.

There are also a large number of program editors, text editors, and similar utility programs available to Apple computer users. Many of these programs are listed throughout this encyclopedia.

Editing—Add Lines New lines may be added to Applesoft and Integer programs by typing in unused line numbers between existing line numbers and entering the required program instructions on the new lines. Most programmers increment program lines by five or ten digits to ensure that this method of adding more program lines is available to them.

Editing—Changing Characters The Edit Mode may be used to change characters in program lines already displayed on the computer screen. First the cursor must be positioned over the character to be changed by using the ESCape key combinations. Then the correct character must be typed in. Once this has been done, the cursor should be returned to its original screen position while the computer is still in the Edit Mode. See Edit Mode.

Editing—Deleting Characters See Edit mode.

Editing—Deleting Lines Lines may be deleted with the methods discussed in the Edit Mode entry, or they may be deleted by using the DELETE command.

Editing—Erase to End of Line See Edit Mode.

Editing—Erase to End of Screen See Edit Mode.

Editing—Escape Sequence See Edit Mode.

Editing—Insert Characters See Edit Mode.

Editing Features—Apple III Computer The Apple III computer has a number of general editing features available to the user. These include: CONTROL-RETURN to move the cursor into the previous screen field; the left arrow to move the cursor left one position (destructive backspace); the right arrow to move the cursor right one space and read characters into memory; the Open Apple-I to toggle the insert mode on and off; and the Open Apple-right arrow to delete the character under the cursor when the user is not in the insert mode and to delete the character to the right of the cursor in the insert mode.

Editor See ED.

Editors There are a number of Applesoft and Integer BASIC program editors available to the Apple computer user. Their products offer search and replace, renumbering, subroutine writing, variable displays, formatting aids, invisible character displays, and similar features to assist programmers.

EDP Electronic Data Processing. Processing data with electronic machines such as adding machines, calculators, and computers.

Education Demo* A sampling of programs offered as educational teaching tools on the Apple computer. Educational Courseware.

Educational Courseware for the Apple* A series of learning modules for students through twelfth grade. Each module covers a specific topic and includes a set of graded questions, student monitoring capabilities, excellent graphics and screen animation. Student numbers can be assigned to assist the instructor in individual progress evaluation. Topics include poetry, weather, grammar, basic physics and math principles, physiology, foreign languages, and more. Avant-Garde Creations.

Educational Reporting Software There are numerous school administration and educational reporting programs for Apple Computer users. They vary in application from class planning and scheduling programs to gradebook programs. These programs include Attendance, The Electric Gradebook, Grading Systems Program, The Class Scheduling System, Roll Call, Assistant Principal, The Grader, The Apple Grade Book, Teacher's Aid, Teachers' Gradebook, Project BASIC, Project Attend, Project Test, Scheduling Package, Daily Class Attendance, Accounting Package, Educational Assessment Scoring System, Grade Reporting System, Class, Gradebook, Compufile, Class Records, Registration, Seating Chart, Grape (Gradebook Replacement), Customized Instructional Management System, Course Manager, Accounting Assistant, Activity Accountant, Attendance Recorder, Class Data Recorder, Mark Reporter, Data Analyzer, Student Data Recorder, Scheduling Assistant, Test Scorer, Quick Score, Gradisk, Modularized Student Management System, Student Payroll, ECS Computerized Gradebook, Academic Secretary, Mid-term Report, Administrative Planning System, and Compugrade.

Educational Software The following is a list of available software which has been reviewed in this book: A Computer Is; A Computer Laboratory Manual for Number Theory; A Teacher for the Apple; Academic Skill Builders—Language Arts; Academic Skill Builders—Math; Accounting Applications for the Microcomputer; Accounting Tutor; Acids and Bases; Addition Tables; Advanced Applesoft; Advanced Dewey Decimal System; Advanced Pascal; Adventure Creator; Alcohol; Alcohol and Health; Algebra Drill and Practice; Algebra I; Alicia—A Bilingual Reader; Anatomy Quiz; Antfarm; Apple Dialog; Apple Music Theory; Apple Sack 2—Home Education; Apple Seed; Aristotle's Apple; Astro Word Search: French; Astro Word Search: Spanish; Astronomy; Astronomy#1; Atoms; Aviculturist III; Az-ED1 Whole Brain Spelling; Basic Chemistry—Semester I; Basic Chemistry—Semester II; Basic Ear-Training Skills; Basic Electricity; Basic Statistics; Beagle Bros. Tipdisk; Biobits I: Life; Biobits II: Magic Flag; Biobits III: Growth; Biobits IV: Interaction; Biobits V: Profile; Biobits VI: Evolution; Biobits VII: Nucleic Acid Connection; Biobits VIII: Analytics; Biographies; Blackjack "21" Strategy (not a game); Bonding; Building Estimation Skills; Bumble Games; California Drivers Test (2 Parts); Carbon Compounds; Cells; Chemlab Simulation #1 & #2; Chemlab Simulations #3 & #4; Chemistry; Chemistry Analysis I & II; Chemistry-Stoichiometry; Chemistry #1; Chemistry #2; Chinese Lessons; Circular Motion; Circulation—Organs; Circulation—Systems; Clouds; Compu-Math I: Fractions; Compu-Start; Computer Aided Instruction for General Chemistry; Computer Assisted Television Instruction (CATI); Computer Discovery Program; Computer Lab in Memory and Cognition; Computer Laboratory Manual for Number Theory, A; Computer Literacy Instructional Program (CLIP); Computer Math Games, Vol.1-5; Computer Models for Management Science; Computer Underteacher; Computerized Career Information System; Computers in the Biology Curriculum; Concentrated Chemical Concepts; Conduit; Con*putation; Conservation; Conservation Laws; Consumer Drug Watcher; Crazy Sentences; Creaturas Excepcionales; Cuantos?; Curve-U.S.A.; Decimals and Percents; Digestive System, The; Dinosaurs; Division; Division Facts; Division With One-Digit Divisors; Dressmaker's Dummy; Drill II; Dynamic Hebrew Dictionary; Ear, The; Early Childhood System; Earth and Its Composition, The; Education Demo; Educational Courseware for the Apple; Effective Study Skills; Electric Grade Book, The; Electricity; Electronic Tool, The; Elementary Arithmetic Edu-Disk; Elementary Math Package I & II; Elementary Mathematics Classroom-Learning System/Fractional/Decimal; Elementary Mathematics Classroom-Learning System/Whole Number Arithmetic; Elementary Numerical Techniques for Ordinary Differential Equations; Energy; Energy at Work; Energy Environment; English as a Second Language; Envelope Construction; Enzkin-Enzyme Kinetics; E.P.I. Retrieval System Reading; Essential Math I, II, III; Essentials Disk; Evolution and Natural Selection; Expanded Notation; Experimenter's Package; E-Z Pilot; E-Z Typing; Fact Sheets; Factoring; Factoring Whole Numbers; Find the Key; Food Facts; Footnote; Foreign/English; Formulas of Compounds Drill; Frac-Dec-Percent; Fractions; French Vocabulary Drill; French1; Fundamental Skills for General Chemistry; General Mathematics; Geoart; Geometrical Optics; Geometry & Measurement Drill & Practice; Going Together—Scatterplots & Correlation Coefficients; Gram-molecular Mass; Guess the Rule; Haber-Ammonia Synthesis; Hail to the Chief; Hand Holding BASIC; Health; Health and Our Bodies; Heart, The; Heat Loss; Hebrew II; Hi-Res Mastertype; Human Body: an Overview, The; Human Skeleton, The; I Speak BASIC: A Computer Literacy Package; ID Game; Infotutor; Innovative Program Associates; Insects; Instant Zoo; Integers/Equations; Intermediate Multipliction and Division; Interval Drillmaster; Introduction to Computers; Introduction to Lo-Res Graphics; Introduction to Organic Chemistry; Introduction to Weather Charts; Invader Round Up; Inventario 1 Whole Numbers; Inventario 2 Fractions; Inventario 3 Decimal; Job Readiness-Assessment and Development; Junior High Math Disk; Junior High Package; Keyboard; Keyboarding; Lab Plots; Language Skills (German, French, Spanish); Latin Hangman; Learning to Understand the Copyright Notice; Lesson in Algebra; Lesson—Tutorgraphs; Life in the Ocean; Light; Limacons and their Areas; Linguist; Linkover; Little Tricks Magnetism; Mastering the Parts of Speech; Mastertype; Math on Computers by Joanne Benton Rudnytsky; Math I; Math I and Math II; Math Ideas with Base Ten Blocks; Math II; Math Sequences—Grades 1-8; Mathematics-Volume 1 (Senior High); Mathematics-Volume 3 (Geometry); Mathgrid; Matrix Manipulation; Matter; Matter and Energy; Mech Science Vol.3; Mechanics; Memory Builder: Concentration; Mendelian Genetics ("Genie"); Metric Drill; Microcomputer Accounting Applications; Microcomputer Testing Program for Accounting: Systems and Procedures Fourth Edition; Microcomputer Workbook Courseware/Software; MicroDeutsch; Micromap II; Mode Drills; Mole Concept, The; Monty Plays Scrabble; Mostly BASIC Scientific Program Package; Motion; Multiplication and Division; Multiterm One; Music Games; Music for Children; Music Theory; Music Tutor; Musical Staff Drill; Musicmaster; Mystery Function; Naming Compounds Drill; New Step by Step, The; No-Nonsense Books; Number Series; Numerical Analysis; Numeros, Todos en sus Logares; Nutrition Volume 1; Nutrition Volume 2; Off Center; Omni Plotting Package; On the Average; Organic Nomenclature; Our Bodies; Palabras en Palabras; Parallel Circuit Analysis; Parts of the Microscope; Pascal Learning Aids; PASS; Percent Concentration; Percent Problems; Personal Aid to Learning; Physical Science Baseball—Chemistry; Piece of Cake; Planetary Guide, The; Polar Graphing; Population Growth; Practicando Espanol Con La Manzana II (Computer-Assisted Instructions in Spanish); Prelab Studies for General, Organic, Organic and Biological Chemistry; Prime Factor; Problem Solving; Problem Solving in Everyday Math; Program, The; Programmer; Programmer Plus; Pythagorean Proofs; Quadratic and the Parabola, The; Qual; Quiz Master—Movie Trivia & Computer Terminology; Radioactivity; Rain; Reactions; Reading Rashi; Real Number System, The; Reducing Fractions; Riemann Integral, The; Rkinet; SAT English I; Scatter—Particles Scattering; Science Volume I—Biology/Physics; Science Volume 4—Physics/Chemistry; Science—Volume 2; Science—Volume 3; Scientific & Games; Scientific Database; Scientific Measurements; Scientific Method, The; Scientific Plotter; Search Sekies, Energy Search; Secondary Package; Senior High Math I Disk; Senior High Math II Disk; Simple Machines; Simulated Computer; Sine and Cosine Grapher; Social & Economic Simulation; Social Studies—Volume 1; Social Studies—Volume 2; Solar Arc Directions (Astrology); Solar System Astronomy; Solar System, The; Solving Linear Equations; Solving Simultaneous Linear Systems; Solving Mysteries of Science; Sound; Space; Space Mouse; Space Scanner; Special Needs Volume 2; Speed Facts; Speed Reader; Spelling Builder; StarGazer's Guide, The; Stoichiometry: General; Strategies for Test Taking; Study Quiz Files; Subject Data Tapes/Files; Successful Job Interviewing; Super Math Package; Supermap; Symbols and Valence Drill; Total Learning System; Turtle; Type Attack; Typemaster; Typing; Typing Teacher; Typing Tutor; U.S. Constitution Tutor, The; Understanding Computers; Using Reference Tables in an Almanac; Verb Usage 1 & 2; Vocabulary Prompter; Vocabulary Skills; Word Race; Word Prep; Word Structure; Wordwise Authoring; Word-A-Tack; Wordskill; World and State Capitals; and 10 Lessons in Algebra.

Educational Software for Children The following software is reviewed within this encyclopedia. See Adding; Addition and Subtraction; Addition Tables; Alcohol and Health; Alphabetize; Antfarm; Apple Flash; Arith-Magic; Arithmetic Racing; AZ-ED1 Whole Brain Spelling; Basic Arithmetic Skills; Basic Fiction Skills; Basic Math Skill Games; Basic Math System H; Basic Math System S; Biology; Biology Energy and Life; Birds; Birth of the Phoenix; Bumble Plot; Calendar Skills; Changing Surface of the Earth; Clock; Clouds; Color Me; Communications; Comparative Buying; Complete-Plant Competition; Compu-Math Arithmetic Skills; Compu-Read; Computer Awareness; Computer Discovery Program; Computer Generated Mathematics Material; Counting; Counting Bee; Counting Programs; Criaturas Excepcionales; Dados Y Dominoes; Decimals; Derivative of Sine; Descriptive Statistics; Dice 'N' Dominoes; Dominio De Palabras; Doremi; Early Civilization; Early Elementary I & II; Elementary—Volume 1 Mathematics; Elementary—Volume 3 Social Studies; Elementary—Volume 4 Math/Science; Elementary—Volume 6; Elementary—Volume 8 Geometry; Elementary—Volume 9 Geometry; Elementary—Volume 10 Geometry; Elementary—Volume 13 Nutrition; Facemaker; Fact Fun; Fig Newton; Fishing For Answers, Addition (Level 1); Following Written Directions; Gertrude's Puzzles; Gertrude's Secrets; Haciendo Los Numeros; Hand/Eye Coordination; History and Geography Package; Hodge Podge; Introduction to Applesoft BASIC; Introduction to Microcomputers; Invader

Attack; Juggles' Rainbow; Lazer Chaser; Learning About Catalog Cards; Learning to Locate Books on the Shelf; Learning to Understand the Card Catalog; Learning to Understand the Title Page; Learning to Use an Index; Learning to Use the Table of Contents; Lessons In Algebra; Lesson—Tutorgraphs; Library Skills; Living Things; Magic Spell; Make a Monster; Mammals; Matching and Using Numbers; Matching Geometric Figures; Math; Math Challenger; Math Concepts; Math Facts Games—I; Math on Computers by Joanne Benton Rudnytsky; Math Machine, The; Math/Spelling Strategy; Measurement I; Medalist—Continents; Media Skills; Melodious Dictator; Memory Myth; Micro Mother Goose; Mind—Memory Improvement Course—Step I; Mix and Match; Money; Moptown; Mult-Facts; Multiplan; Multiplicacion & Division Fun; Multiplication Facts Diagnostic; Multiplication Grafica; Multiploy; Music for Children; Mystery House; Palabras, Palabras; Personal Aid to Learning; Pescando Respuestas, Adicion; Pescando Respuestos, Substracion; pH Concept; Picture Library; Place Value; Plants and How They Grow; Population Growth; Preschool Fun; Preschool IQ Builder; Pre-Schooler; Prescriptive Math Drill; Primary Math Worksheet; Reading Comprehension—Level D (Reading Level 4); Reading Games; Reproduction—Process; Reproduction Organs; Rocky's Boots; Schoolhouse I; Science; Secuencias; Sentences; Sets; Simple Multiplication and Division; Soccer Math; Spelling Bee; Spelling III; Stacey's Math Series; Student Payroll; Teddy Bear's Counting Fun; Telling Time; The Doctor Game!; Wild Sign; and Whole Brain Spelling World Polar/Desert Regions.

Educational Software—Primary Level The educational software field is growing constantly as school systems acquire computers for student use and families invest in home computer systems. Most of the programs available for educational use are interactive programs which require the entry of a response by the user to a question or problem. Some of these programs utilize game features, animation, and other graphics displays to teach. An immense amount of primary level educational software is available to Apple Computer users. This software includes Memory Builder, Fact Fun, Alphabetize, Counting Bee, Math I, Early Elementary I, Early Elementary II, Reading Games Series, Counting Programs, Drill II, BASIC Arithmetic Skills, Elementary Volume 1 (Mathematics), Elementary Volume 4 (Mathematics & Science), Elementary Math Edu-Disk, Arithmetic Racing, Mathematics Volume 2 (Measurements), Math Challenger, Adding Machine, Stacey's Math Series, Math Word Problems, Basic Math Skills Game, Compu-Math I:Fractions, Math Grid, Multiplication and Division Fun, Speed Facts, Math Concepts, Metric Drill, Soccer Math, Math I and Math II, Arith-Magic, Fractions, Factoring Whole Numbers, Decimals, Basic Math System S, Basic Math System H, Math Tutor, Math Facts Game, Mult Facts, Division Facts, Measurement I, Lazer Chaser, Percent Programs, Reducing Fractions, Frac-Dec-Percent, Invader Attack, Space Scanner, Space Mouse, Invader Round Up, Problem Solving In Everyday Math, Computer Math Games Volume I, Computer Math Games Volume 2, Computer Math Games Volume 3, Computer Math Games Volume 4, Computer Math Games Volume 5, Elementary Mathematics Classroom Series, Essential Mathematics I, Essential Math II, Essential Math III, Whole Numbers, Decimals & Percents, Fractions, The Math Machine, Building Estimation Skills, Bumble Games, Bumble Plot, Addition and Subtraction, Fractions, Multiplication and Division, Money, Matching Geometric Figures, Counting, How Many?, Sequences, Adding, Addition Tables, Fishing for Answers, Number Guess, and Times Tables.

Educational Software—Secondary Level Secondary level software tends to center around math, chemistry, physics, SAT preparation, foreign language skills, language arts, and music. These programs are too numerous to list, but many of them are described in this encyclopedia.

Edu-Paint* Create art with your computer. Colors, patterns, and "fill" routines are included in Edu-Paint. You can also save and recall any part of the picture. San Juan Unified School District.

Edu-Ware Fraction 3.0* An enhanced version of Compu-Math Fractions. Monochrome monitors are quite adequate since the use of color is not a major feature of this package. An excellent Learning Manager Master Menu is designed to set up the package and present it to the student. It is possible to preprogram the units to be tested. The available units are: definitions and parts of fractions, denominators, addition of fractions, subtraction of fractions, multiplication of fractions, and division of fractions. Sound effects can be turned off. Some of the handling of denominators (lowest common denominator) is awkward—asking for the reduced form when the fraction already is in that form. The use of zero as a numerator when the answer is a whole number is also unusual. 48K. Edu-Ware, Services, Inc.

Effective—Series of Programs for the Manager* Listed below are programs, offered by BLS, Inc., to help the executive learn to perform more effectively.

Effective Decision Making, Effective Delegation, Effective Executive Practices—Short Course, Effective Managerial Control, Effective Organization Practices, Effective Planning, Effective Use of Executive Time.

Our current information indicates that these programs are available separately. BLS, Inc.

Effective Secretarial Practices* Become an even better secretary than you already are with this helpful program. It measures the three qualities that are thought to be essential for a good secretary: 1)pleasing personality; 2)performance excellence; and 3)good communication skills. 48K. BLS, Inc.

Effective Study Skills* Covers organization of study areas as well as how to most effectively organize your study time. Then there is an evaluation of your learning practices. Based on this evaluation, the computer suggests ways to improve your study habits. Mesa Research.

EFL Emitter-Follower Logic. A transistor circuit in which the base element is common to the output and input circuits.

EI-2 Electronic Interface* Lets owners of the Zygo Model 100 use the Apple II keyboard without special programs. The EI-2 circuit card includes two attached connecting cables, is easy to install, utilizes the AUX Output Connector, and offers a display panel that illustrates the command pattern for the EI-2 Interface. Zygo Industries.

EIA Electronic Industries Association.

EIA-RS-232C The EIA standard for serial data transmission interfaces for asynchronous communications. Data is sent in 10 or 11-bit serial bundles. The first bit is called the start bit. It signals the beginning of the data. The data bits follow, from least to most significant. Following the last data bit comes the stop bit.

Einstein Compiler, The* The Einstein Compiler is a program which converts other programs written in Applesoft BASIC to Machine language programs. It is well documented and easy to use. It runs on the Apple II, Apple II+, and Apple IIe computers with at least 48K in RAM and at least one disk drive operated by DOS 3.3. The program requires Applesoft available in ROM or on a RAM expansion card such as the Apple Language Card. This program runs on the Apple III computer in the emulation mode.

Most programs written in Applesoft BASIC run relatively slowly compared to the same programs written in Machine language. The increase in program running speed is usually significant enough to warrant compiling long, complicated programs or programs with graphics or animation routines if these routines are written in Applesoft. A number of programs tested after compiling ran 50% faster than the interpreted Applesoft version of the program. Some ran 100% faster.

The Einstein Compiler is easy to use for anyone with a reasonable amount of experience with an Apple computer. No extensive programming experience is required unless errors are encountered as compiling progresses. If the program being compiled has been error free during extensive runs, this shouldn't be a concern. This compiler has a number of useful features. It compresses program length by allowing variables to be passed from one part of the program to another. It also compresses programs by using a REM statement removal utility. Its debugging capabilities are flexible enough to allow compiling to continue even after errors are encountered.

The Einstein Compiler follows the steps described below in carrying out the process of compiling a program: 1) It makes a preliminary analysis of the program being compiled and registers all variable names, all string literals, all data statements, all numeric constants, etc.; 2) It then asks the user if the default compiler parameters should be changed and allows him to change these parameters if necessary; 3) The program then generates a display of a symbol table for the program being compiled. This symbol table lists each variable in the program, identifies it as to type, and displays its address and length; 4) The compiler then analyzes the program to see if it can be compressed; 5) If compression is possible, it then compresses the program; 6) After compression is complete, Machine Code is generated for the program; 7) The compiler then resolves all branch statements to ensure that the Machine language version runs properly; 8) It then compiles a sample program and tests it; 9) Finally, the program is compiled. These steps occur without intervention of the user unless errors are encountered. The Einstein Compiler is extremely powerful for such an easy-to-use program. The Einstein Corporation.

Electric Grade Book, The* With The Electric Grade Book, teachers may record grades for assignments and tests for each student. The weight percentage is calculated giving an up-to-date summary analyzing each student's performance. Charles Mann & Associates.

Electrical Engineering Series* Logic Simulator—digital logic simulation is performed by this menu-driven program. Logical networking of inputed specifications is quickly checked in bit-time response parameters. Logical Designer—User created hi-res graphics can be drawn on the screen to help design digital logic systems. Spectrum Software.

Electricity* Talks about electric forces, currents, fields, kinds of charges, circuits, units in amperes, ohms, volts, and electric power. Designed for junior high students. 48K. J & S Software.

Electricity* Learn all about this shocking subject. Basic concepts of electrons, current and static electricity, safety rules, and more. A game is included. Available on disk or cassette. Right On Programs.

Electron The elementary unit of negative electrical charge. Often conceived as a particle circling around the nucleus of an atom. Electrical current is a flow of electrons.

Electron-beam A straight (rendered in parallel waves) beam of electrons used in manufacturing ICs and in CRT display systems.

Electronic Banking As computer communications become more widespread and more families and businesses obtain computer communications equipment, Electronic Banking by computer should become a common occurrence. There are a few test programs in use in Knoxville, Columbus, and Boston. Chemical Bank of New York and Bank of America of California are already offering bank-at-home services, and CompuServe offers electronic banking to users in certain parts of the United States for anyone who is interested in pursuing this application.

Electronic Breadboard, The* A great help in design and analysis of electrical circuitry. Inputing sample data on circuits to determine frequency response is one of the techniques used to review the user's electrical knowledge. Subjects include: voltage evaluation, currents, and frequency response. Requires 32K. Applesoft. Instant Software.

Electronic Disk Same as RAM Disk (q.v.).

Electronic Library Aide* This program becomes a computerized card catalog/database for your school library. You can create your own fields for referencing in addition to the standard fields of title, subject, author, etc. You can search and sort your catalog when your need to. 3.3 DOS; 48K. Society for Visual Education.

Electronic Mail Many telecommunications programs for microcomputers have features which allow the user to access various Electronic Mail systems. Teletype emulators and similar program features give the user access to any Telex or TWX machine as long as you know its call number and answer back. Mailgrams are available through Western Union via The Source, and other electronic mail services are available from the Source and from Compuserve.

Electronic Price-Sheet* A sales tool for retailers developed by Scot Kamins. Features purchase configuration, product line displays, computation of discounts, product line maintenance, and printing of customized price quotes. 48K. Stoneware Microcomputer Products.

Electronic Shopping Comp-U-Card offers shopping via modem to people with personal computers. The Source and CompuServe offer similar shopping services in their communications packages. This service is available to anyone with a computer, a modem, a customer number with one of these services, and a valid credit card.

Electronic Tool, The* This educational program in computers is designed for seventh grade and up. It introduces the user to certain computing terms and lets him interact with the computer. He will be able to create records and files which are then used by the computer to demonstrate record accessing and searching. Two simulation programs are included to explain the "what if..?" capabilities of the computer. Applesoft; 32K. Micro Power & Light Company.

Electronic Worksheets A generic name given to free form, on-screen spreadsheet programs which have built-in formatting and mathematical capabilities. These programs give the adept user the ability to design and use his own financial analysis and reporting applications. The programs which are available for the Apple computers are VisiCalc, VisiCalc Advanced Version (Apple III only), SuperCalc (with CP/M), Multiplan (DOS 3.3), Multiplan (CP/M), Magicalc, UltraCalc, and several others.

Electronics I, II, III* A series containing a total of twenty programs that cover a wide variety of electrical concepts. Some of the subjects include; Transistor Bias Parameters, Single-Stage Transistor Amplifier Design, Zenor Diode Voltage Regulator Design, Four Quadrant Arctangent Function, Minimum and Maximum Values of an Array, Roots of Polynomials with Real Coefficients, Inverse Laplace Transforms of a Transfer Function, Fourier Series Expansion of a Periodic Function, Analysis of Damped

Oscillation, and many more. Cassette or Disk. Advanced Operating Systems.

Element A term used to describe the values or variables which make up a data statement or an array. Data and array elements may be strings or numbers. They must be contained in a legal data statement or must be properly entered into a dimensioned array.

Elementary Arithmetic Edu-Disk* A series of interactive lessons for basic math skills and an arithmetic readiness test. Includes color graphics and a computer simulated voice. Scores may be accessed by the teacher with a special program. Recommended for the novice math student. Muse Software.

Elementary Math Edu-Disk* Teaches the four basic math functions: addition, subtraction, multiplication, and division. The program is designed for grades K through three. Uses nine skill levels, lo-res graphics, and Apple's speech capabilities. 48K. Muse Software.

Elementary Math Package I* Introduces the student to decimal number systems, number string drills, and graphic math drills. Several levels of difficulty are included. Micro Learningware.

Elementary Math Package II* Tutorials on decimals, fractions, number guessing, a numbers game with graphics, and a game of consecutive numbers. The computer is the perfect foil. Micro Learningware.

Elementary Mathematics Classroom—Learning System—Fraction/Decimal Arithmetic* Same as above using fractions/decimals. Sterling Swift Publishing Company.

Elementary Mathematics Classroom—Learning System—Whole Number Arithmetic* A bilingual (Spanish/English) program that supports math in the intermediate and junior high school grades. Included are: Tutorial Approaches; Drill and Practice Exercises; High Quality Corrective Feedback; Games; Embedded Mastery Tests; Achievement Record-Keeping Capability; and Information Reports. Sterling Swift Publishing Company.

Elementary Numerical Techniques for Ordinary Differential Equations* Some of the exercises require that the students have a minimal knowledge of BASIC, since minor program modification is needed. Apple's graphics are well utilized in this package, which shows how the computer can be a valuable tool in solving many types of equations, introduces students to the simpler numerical techniques, and helps students design numerical solutions to scientific applications. 48K; DOS 3.2 or DOS 3.3. Conduit.

Elementary Numerical Techniques for Ordinary Differential Equations* A tutorial for a post-calculus differential equations course. The series offers standard formulas for trigonometric and exponential functions and their inverses, integration by parts, integration by trigonometric substitutions, and integration by partial fractions decomposition. Also deals with power series and interval of convergence. COM Press.

Elementary Volume 1—Mathematics* Elementary students may practice skills in the metric system and logic with these games. Minnesota Educational Computing Consortium.

Elementary Volume 3—(Social Studies)* A series of educational programs for children in grades three through six. Topics included are a series on selling various items from apples to bicycles, a Civil War battle reenactment, and two programs on U.S. state capitals and locations. Minnesota Educational Computing Consortium.

Elementary Volume 4—Math/Science* This educational package for grades two to six includes five programs. Estimate challenges the student to come up with an estimate for answers to a variety of math problems. Odell Lake is a food chain simulation for a North American lake. Math Game drills students on the four basic operations. Ursa teaches the constellations of the northern hemisphere. Solar Distance demonstrates the huge distances between heavenly bodies by projecting how long a trip would take using conventional means of transport. 32K; disk. Minnisota Educational Computing Consortium.

Elementary Volume 6* A set of five historical simulations for use in the elementary classroom. Included are Oregon, Voyageur, Furs, Nomad—a map-reading program, and Sumer. A booklet is provided with ideas on classroom implementation and applications. Minnesota Educational Computing Consortium.

Elementary Volume 8—Geometry* Includes concepts of point, line and line segments, rays, types of angles, plus two quizzes. Minnesota Educational Computing Consortium.

Elementary Volume 9—Geometry* Includes parallel, perpendicular, and intersecting lines, different types of triangles (scalene, isosceles, equilateral, acute, right, obtuse, and equiangular), plus two quizzes. Minnesota Educational Computing Consortium.

Elementary Volume 10—Geometry* Includes different types of quadrilaterals (parallelogram, trapezoid, rectangle, squares, and rhombuses), and the properties of geometric shapes including area and perimeter. Minnesota Educational Computing Consortium.

Elementary Volume 13—Nutrition* A three-program package designed for fifth and sixth graders to analyze their own diets. After entering foods consumed, they will be able to see the calory intake and nutritional value of each item. A short dietary lesson is included at the end. 32K; disk. Minnesota Educational Computing Consortium.

Elements of Music* A wonderful introduction to the elements of music at the beginning level for children and non-music majors. The components include Ear Challenge, Key Signatures, Pitch Names, Pitches on the Keyboard. Electronic Courseware Systems.

Elephant Floppies The EMS #2 is a 5 ¼ inch floppy diskette: single-sided, double-density, soft-sector with hub ring, and certified 100% error-free. Leading Edge Products, Inc.

ELF Statistical Package* A program that uses the masking system to update, correct, and create a database. Other features include transforming data, univariate statistics, correlation coefficients, stepwise regression, factor analysis, and other capabilities. The Winchendon Group.

ELINT ELectronic INTelligence. This term describes the various methods used by a country to gather information about military and civilian activity in another country. The methods employed in this field include passive measures which involve listening to communications frequencies and active measures which involve direct probing via hardwire and radio frequencies.

Elite-Controller* Control one to four disk drives with this card, which is compatible with DOS 3.3 and CP/M. Rana Systems.

Elite-Two* This drive is similar to the Elite-One and Elite-Three. It gives you 320K of storage on a double-sided, forty-track floppy disk. Rana Systems.

Eliza* Eliza is a non-directive psychotherapist that examines statements in detail, as they are typed in, and responds with its own questions or comments. Created at MIT in 1966, Eliza is designed to run on a large mainframe. Up to this time it has not been available to personal computer users except in greatly stripped down versions which lacked the sophistication of the original program. This new microcomputer version possesses all the power and range of expression of the original. 48K; disk. Artificial Intelligence Research Group.

ELSE The ELSE clause has been added as an option to the normal IF...THEN statement in Apple III Business BASIC. This extension of the IF...THEN statement gives the user a chance to execute branches when the IF...THEN expression is false. This provides the user with a choice of subroutines rather than returning him to the main program at a higher line number.

EMAIL An abbreviation for electronic mail. See Electronic Mail.

EMF of Electrochemical Cells* Requires the calculation of the EMF of randomly synthesized cells. Microphys Program.

EMI ElectroMagnetic Interference. Interference caused by electrical fields produced by capacitive coupling, or magnetic fields produced by mutual inductance, or electromagnetic fields (e.g. radio waves).

Employee Profiles (Evaluations)* Receive an overall view of those working for you. This program presents a series of questions that can be asked for employee, departmental, or other group evaluation. A comprehensive and detailed data-gathering tool to gain more insight into people's work abilities and attitudes. Paul's Electric Computer.

Emulation The Apple III has been given the ability to run programs written for the Apple II computers through the use of the Apple II Emulation Disk which is supplied with the computer. This software makes the Apple III act like an Apple II or Apple II+ computer. Use of this program starts with an Emulation Configuration Menu which allows the user to select a language and to configure his system for its peripherals. The emulation mode will not run any program which requires 16K expansion in the Apple II or Apple II+ computers. Access to the Apple language system and Integer BASIC firmware is not available. No color graphics are available on the Apple III high-resolution screen.

Enable To make a device ready or available to function. Opposite of disable.

Encyclopedic Databases The computer user with a modem can gather information from a large number of encyclopedic database systems in the United States. These databases are stored on large computers. The information they contain is available to microcomputer users via telephone lines. DIALOG, BRS, and ORBIT are examples of the largest of these databases. These three draw information from other smaller information sources and offer certain exclusive features of their own. Most such databases offer bibliographic information and abstracts of articles and books. Some interesting ones for microcomputer users might be Microcomputer Index, International Software Directory, Books in Print, Magazine Index, and Electronic Yellow Pages. You should consult local users groups in your area and local telecommunications interest groups for more information on those databases which are available to you.

END This BASIC command is available in Integer BASIC, Applesoft BASIC, and Apple III Business BASIC. It instructs the computer to stop the execution of the current program and return control of the computer to the user. It must be the last line of a program. In Integer BASIC, if the last line is not an END statement, the computer will return a NO END ERR message. In Applesoft BASIC and Apple III Business BASIC, the END statement is not required. If it is used, it will halt the program and close files.

End a Program or DOS Function Press CTRL-C together at any time in all applications. See Control Keys.

End Current Line Press RETURN to end the current line, send the line to the requesting program, and put the cursor at the start of the next line. This is valid under DOS and BASIC.

End of Data The END OF DATA error message in Apple DOS 3.3 indicates to the user that the computer has tried to load data from a portion of a text file where no information has been stored. This error message generally appears on screen immediately after an INPUT or GET command. If there are fewer data fields stored on disks than the number of INPUT commands in a program, this eror message will appear. The same thing occurs if there are more GET statements than data elements. The message will also be displayed if the byte parameter in a READ statement or the relative field position parameter in a POSITION statement is too large for the data which is contained in a sequential text file.

End Operation in DOS—Cancel Current Operation Upon pressing CTRL-C the current operation is cancelled.

Energy* Discusses kinetic and potential energy, the conservation of energy, the ways in which energy, force, and work interact, and talks about how some simple machines use energy. 48K. J & S Software.

Energy at Work* Discusses five forms of energy: electrical, mechanical, atomic, solar, and chemical. Explains, in simple language, the origins and uses of each form of energy. A quiz game rewards correct answers and corrects wrong ones. Disk or cassette. Right On Programs.

Energy Environment* This software acts as an interactive teaching device as well as perfoming calculations. It is designed for use in conjunction with courses on the environment, physics, or physical science. Concepts taught and utilized by the program include, quantitative reasoning, model formulation, rates of change, and functional dependencies. Three programs are included: Profile, which calculates demographic figures for stable age configurations; Populate, which simulates a population growing in response to user-definable population statistics; Absorb, which uses a single-layer model of the atmosphere to determine the earth's surface temperature given different concentrations of carbon dioxide; and Glacier which addresses the temperature at differing latitudes using Budyko's model. COM Press.

Energy Miser* Analyzes the heating and cooling operation of your house or office. It can predict the savings from modifications or improvements and can calculate energy tax credit. Hayden Book Company.

Energy Monitor—Energy Use Monitoring System* Maintains records and reports on energy usage, by type, for as many as ninety different buildings. Provides a well organized basis for making energy conservation decisions. Makes monthly and yearly fuel usage comparisons, for individual units or properties overall. Will make cost comparisons between units and between types of fuel. The user need not be familiar with computers to use this system, but a printer is highly recommended. 48K. Addison-Wesley.

Engineering Software See Active Filter Design; Air Conditioning Calculations; Construction Material List Generator; Economic Analysis Group; Electrical Engineering Series; Electricity; Electronic Breadboard, The; Electronics I, II, & III; Harmonics and Arc Transforms; Hi-res Editor; Hi-Res Electronic Design; Instant Mathematical Programming; Lighting Calculations (Indoor-Outdoor); Logic Designer and Simulator; Mat Man; Mathematics Series; Microcomputer Circuit Analysis; Multiplan Electronic Worksheet; Omnigraph; Op-Amp Design; Parallel Circuit Analysis; Pixe-Plexer; Pixe-Verter; Project Management Group; Scope Drive, The; Sci-Pack; Stat Trak; Uni-Solve, The Electronic Designer; TMUCAP; Vidichart; 7470-01 DCD A/D Converter.

English as a Second Language* Perfect your use of the English language with this sixty-disk program. Created at Brigham Young University. COM Press.

Enhanced Graphics Software* Lets the user make hard copies of Apple II hi-res pages. It has easy loading of binary printer interface cards with normal or inverse printing, helpful for printing graphs. Commands are executed by a single keystroke. Files are in two different sizes and on three different positions on the page. This software, easily understood by the beginner and offering flexibilty for the experienced programmer, is well documented. Computer Station.

ENQ ENQuiry control character.

ENQ/ACK The Apple III RS-232 Driver can use any one of four different modes to communicate: no protocol (handshake) mode; an XON/XOFF software-driven protocol; an ENQ/ACK software driven protocol; and a hardware-supplied protocol. The ENQ/ACK protocol requires that data blocks of fixed length be transmitted or received by the computer. In the Apple III this protocol is used only for input (reception) of data unless the user has added a routine to the driver to scan incoming data. This protocol requires the sending computer to send the receiving computer an ENQ (inquire as to ready to receive) signal. The receiving computer sends an ACK signal to the sending computer when its buffers are empty and ready to receive input. The sending computer sends a block of data when this signal is received.

Enter Key The Apple III computer's numeric keypad is equipped with an ENTER key which is used as a RETURN key for the numeric keypad. This key and the RETURN key are used for the same functions on the Apple III keyboard.

Entering BASIC from the Monitor If you are programming in Assembly language or Machine language and wish to return to the BASIC language in your Apple's ROM, press CTRL-B. This method returns you to BASIC, but it erases any programs which were in memory when you entered the Monitor. To return to BASIC with computer memory intact as it was when you entered the Monitor, press CTRL-C. One other method is available to return to BASIC from the Monitor. Enter:

```
3D0G
```

followed by RETURN.

Be sure to type 3-D-zero (3D0), the hex address of Applesoft in ROM, followed by G, the monitor command for GO(TO).

Entering the Monitor To enter the Monitor of the Apple II and Apple II+ computers, type:

```
CALL-151
```

followed by RETURN. This will place you in the Monitor for Machine language programming. This method works for the Apple IIe computer as well.

Envelope Construction* A great tool for learning about musical timbre and acoustics. It designs and constructs musical timbres by plotting the envelope, displayed as a 3-D graphic, of each harmonic in a sound. This program has the capacity to manipulate one at a time, the three dimensions (harmonic content, amplitude and time) that create synthesized sound. 48K. Micro Music, Inc.

Envelope Shaper* This program will orchestrate music that has been composed and arranged with Music Composer. You can select different instrument sounds, pitch, and octave transposition repetitions for any section of music with the addition of codes. Enveloping techniques include realistic timbres—plucked string, bass, winds, and others. One of four stereo channels can be specified and changed for one of the four voices. All interpretive controls with Shaper can be changed during the performance. 48K. Micro Music, Inc.

Environment The state of all registers, memory locations, and other conditions in a system. Also used to refer to a software environment such as DOS.

Enzkin-Enzyme Kinetics* Students can enhance their understanding of the fundamentals of enzyme kinetics and catalyzed reactions. Computing initial velocities, curves to graphs, and more is required. 48K. Conduit.

EOB End Of Block.

EOC End Of Character; also End Of Conversion for an ADC.

EOF End Of File. This abbreviation is a reserved variable in Apple III Business BASIC. It can be used in a program line or with a PRINT command to display the end of a file. In CP/M, EOF is a signal sent to a receiving device when the end of the file being sent is reached.

EOR The 6502 microprocessor mnemonic for Exclusive OR (XOR). This conditional statement indicates that one of two available conditions must be true before the program branches to a particular step. Also, Electro-Optical Reconnaissance. Gathering information through electrical and optical surveillance. Used in scientific studies, military, and espionage applications.

EOT End Of Transmission.

EPF IV* Designed to be an interactive part of BASIC programming, EPF IV contains four sections. The Applesoft Editor is a full-screen editor with auto renumber, global find and change, insert and delete (by line or character), macros, manual renumber, scrolling, variable, line and label cross-reference, and function keys for display of REM records. Data Management Subsystem creates a full-screen display of the DOS catalog. Single keystroke functions performed on the catalog are file copy, verify, clock, delete, undelete, unlock, and complete disk copy with a oneor two-drive system. Through simple program entries, Program Library Subsystem allows including or copying programs from other DOS files into a target program. Edit Time Label BASIC allows you to use labels during editing instead of line numbers. Sierra On-Line Systems.

Ephemerides A calendar or diary of daily events (used in astrological forecasts).

EPROM Pronounced "ee-prom". Erasable Programmable Read-Only Memory. A PROM which can be reprogrammed several times. Typically, an ultraviolet-erasable PROM which can be erased by exposing it for several seconds to hard ultraviolet light. It is then reprogrammed with a special PROM programmer, and will retain contents for years. A UV-erasable EPROM may be recognized by the quartz window over the chip. Other EPROMs are electrically erasable.

EPROM Board* You can add up to six additional 10 or 12K EPROMS on each board giving your Apple computer more ROM memory. The ROM is accessed through bank switching under either hardware or software control. Microproducts.

EPROM Programmer* A device that connects with the Parallel I/O card or JBE I and is designed to program five volt 2716, 2516, or 2532 EPROMS. It includes documentation and programs for writing and reading. Available assembled or in kit form. John Bell Engineering, Inc.

EPROM Programmer* This board comes fully assembled and is completely self-contained. You can program INTEL 2716s, 2758s, and other 5-volt EPROMs to turn your computer into a powerful software development system. Microproducts.

EPROM Socket Adaptor* Will adapt your five-volt 2K EPROMS to Apple RAM slots. You can transform your programs into firmware or do a variety of applications. Microproducts.

Epson Printer Control Characters with BASIC. The Epson Printer Control Codes outlined below may be included in program statements written in BASIC to access the printer for output of data.

Epson Printer Control Codes The Epson MX-80 dot matrix printer can be instructed from within programs to use a particular type size, style, or density. These instructions are given to the printer in the form of control codes. A table of these control codes appears below:

ASCII(CHR$) CODE	FUNCTION
CHR$(0)	Terminate Tab Settings (After EXC B OR D)
CHR$(0)	Set line space to ⅛″ (After ESC A)
CHR$(1)	Set line space to 7/72″ (After ESC A)
CHR$(2)	Set line space to space prior to ESC A
CHR$(7)	Sound buzzer
CHR$(10)	Send Line Feed
CHR$(11)	Tab Vertical 1 Line
CHR$(12)	Form Feed Paper
CHR$(13)	Carriage Return
CHR$(14)	Output Double Width
CHR$(15)	Output Compressed Characters
CHR$(17)	Select Printer for Output
CHR$(18)	Disable Compressed Character Mode
CHR$(19)	Disable Selected Printer
CHR$(20)	Disable Double Width
CHR$(24)	Cancel Unprinted Data
CHR$(27)	Escape
CHR$(69)	Enable Emphasized Mode
CHR$(27)	Disable Emphasized Mode
CHR$(27)	Enable Double Strike Printing

EP12 Printer Interface* See CE12 Printer Interface.

EQU Assembly language mnemonic for EQUals.

Equip* Equip will calculate the financial status of your school, taking into account all of your school's physical assets. Your inventory is organized, sorted, and evaluated. Addison-Wesley.

ERA CP/M built-in command. It instructs DOS to delete a specified file from disk. To use this command, you must include the file's extension and must specify the disk drive containing the file. An example of the use of this command is:

```
ERA B:BIGFOOT.BAK
```

followed by RETURN. The command may also be used to erase all files with the same extension or all files of a particular type from a diskette. For example:

```
ERA B:*.COM
```

followed by RETURN would erase all COM files from the disk.

ERAQ A CP/M transient command which instructs the computer to consecutively erase all files with the specified name. For example:

ERAQ B:BIGFOOT

followed by RETURN would erase all files with the name BIGFOOT on the disk. As this command is operating, it prompts the user by asking if each of the file types designated by extensions should be erased. This prompting feature is the feature which sets this command apart from ERA.

ERASE The CP/M equivalent of DELETE. See ERA and ERAQ.

Erase a Program from BASIC See NEW.

Erase All BASIC Program Lines Applesoft BASIC, Integer BASIC, and Apple III Business BASIC use the NEW command to erase all of the program lines in memory. Make sure you've saved the program you're writing prior to using this command if it is a program you wish to keep.

Erase BASIC Program Lines The DEL command in Integer BASIC and the DELETE command in Applesoft BASIC and Apple III Business BASIC instruct the computer to erase the specified line or lines from memory. Another method which deletes a single program line is to enter the line number followed immediately by RETURN. See DELETE and DEL.

Erase Current BASIC Variables See CLEAR.

Erase Current Line CTRL-X is used with all of the Apple Computers to erase the line currently being typed. This control code displays a backslash on the screen at the point where the code was initiated.

Erase File In CP/M the ERA and ERAQ commands are used to erase files from a diskette. In Apple DOS 3.3 and Apple III SOS, DELETE is used to erase a file from disk.

Erase Last Character The left arrow key is used on all Apple computers as a destructive back space. When the left arrow moves over a character, it is instructing the computer to forget that character. The Apple IIe computer is equipped with a "Backspace" key which erases the character to the left of the cursor by backspacing over that character.

Erase Program Line See Erase Current Line.

Erase Screen Display Control The screen display on the Apple II, Apple II+, Apple IIe, and Apple III may be erased by typing:

HOME

followed by RETURN. This will clear the screen and place the cursor in the upper left hand corner of the screen. The screen may also be cleared by entering:

CALL-936

in Integer BASIC. ESCape-SHIFT-P also clears the Apple's screen.

Ernie's Quiz* A collection of games including Guess Who, a name-that-monster game featuring the Muppets; Jelly Beans, in which you count colorful jelly beans in a jar; Face It, in which you create a face and change its features; and Ernie's Quiz, that asks questions about the characteristics of the various Muppets. Recommended for ages four to seven. 48K; requires paddles. Apple Computer, Inc.

ERR APPLE III Business BASIC uses ERR to express to the programmer and user the nature of any errors encountered in a program as it is running. The ERR message is used with the Apple IIe computer in operations where data is saved to tape to ensure that all data has been stored correctly. The computer performs a checksum operation on the data prior to transfer and checks it again after transfer. If the checksums are not equal, the ERR message is displayed on the computer's screen. In Integer BASIC, the abbreviation ERR is displayed after a word describing the type of error encountered as a program is being run.

ERRLIN Apple III Business BASIC displays the line on which an error is encountered with the ERRLIN message followed by the line number of the line containing the error.

Error Correction Methods used to correct erroneous data produced by defective or unreliable data storage and transmission systems.

Error Message A statement or code printed out or displayed on the screen by a program to let you know what is happening. Error messages tell you something about your problem.

Error Messages "User friendly" computers and computer languages have means by which users and programmers can tell where an error has occurred in a program and what sort of error has occurred. Presented below is a list of error messages which are displayed in various languages and operating systems on Apple computers.

ERROR MESSAGE	LANG/MACH	DESCRIPTION
BAD BRANCH ERR	INT/II,II+,IIe	Branch to nonexistent line #.
BAD NEXT ERR	INT/II,II+,IIe	NEXT with no previous FOR.
BAD PATH ERROR	BUS BASIII/	Reference to nonexistent file or path.
BAD SUBSCRIPT ERROR	BUS BASIII/	Attempt to reference element not in array.
BAD SUBSCRIPT ERROR	AS/II,II+,IIe	Attempt to reference element not in array.
CANT CONTINUE ERROR	AS/II,II+,IIe	Tried to CONTinue program not in memory.
CANT CONTINUE ERROR	BUS BASIII/	Tried to CONTinue altered program.
DATA WONT FIT ERROR	BUS BASIII/	Not enough room in file for data being saved.
DEVICE NOT FOUND	BUS BAIII/	Access tried to unconnected or non-configured device.
DIM ERR	INT/II,II+,IIe	More than one attempt to DIM same array.
DISK FULL	DOS/II,II+,IIe	Tried to save data to full disk.
DIV BY ZERO ERROR	BUS BASIII/	Tried to divide by zero in formula.
DUPLICATE FILE ERR	BUS BASIII/	Tried to RENAME file which already exists.
END OF DATA	DOS/II,II+,IIe	Tried to READ nonexistent file field or part.
EXTRA IGNORED	AS/II,II+,IIe	Too much data entered in INPUT statement—only proper amount was accepted.
EXTRA IGNORED	BUS BASIII/	Too much data entered in INPUT statement—only proper amount was accepted.
FILE LOCKED	DOS/II,II+,IIe	Attempted to SAVE or DELETE a locked file.
FILE LOCKED ERROR	BUS BASIII/	Attempted to modify a locked file.
FILE NOT FOUND	DOS/II,II+,IIe	Tried to load nonexistent file.
FILE NOT FOUND ERR	BUS BASIII/	Tried to access nonexistent file.
FILE NOT OPEN ERR	BUS BASIII/	Tried to access unopened text file.
FILE TOO LARGE ERR	BUS BASIII/	File bigger than allowed by SOS.
FILE TYPE MISMATCH	DOS/II,II+,IIe	Tried wrong command for file type to be loaded.
FILES BUSY ERROR	BUS BASIII/	Tried to DELETE or RENAME open text file.
FORMULA TOO COMPLEX ERROR	AS/II,II+,IIe	More than two IF...THEN statements executed.
FORMULA TOO COMPLEX ERROR	BUS BASIII/	More than 14 parentheses or more than 14 expressions.
I/O ERROR	DOS/II,II+,IIe	Can't read this disk due to bad sector, drive door open, etc.
I/O ERROR	SOSIII/	Can't read or write this disk due to bad sector, etc. peripheral does not respond.
ILLEGAL DIRECT ERR	AS/II,II+,IIe	Attempt to use deferred mode command in direct mode.
ILLEGAL DIRECT ERR	BUS BASIII/	Same as Apple II series.
ILLEGAL QUANTITY ERROR	BUS BASIII/	Parameter input is out of range of numbers computer can handle.
ILLEGAL QUANTITY ERROR	AS/II,II+,IIe	Numeric value outside allowable range.
INVOKE ERROR	BUS BASIII/	Path used by invoke to access file does not exist or file does not exist.
LANGUAGE NOT AVAILABLE	DOS/II,II+,IIe	Language of program being used is not in memory.
MEM FULL ERR	INT/II,II+,IIe	Bad tape load or out of RAM space.
NEXT WITHOUT FOR ERROR	AS/II,II+,IIe	NEXT statement used in program without preceding FOR.
NEXT WITHOUT FOR ERROR	BUS BASIII/	Same as Apple II series.
NO BUFFERS AVAILABLE	DOS/II,II+,IIe	Too many file buffers in use during LOAD or SAVE operation.

ERROR MESSAGE	LANG/MACH	DESCRIPTION
NO END ERR	INT/II,II+,IIe	Final program line not END.
OUT OF MEMORY ERROR	BUS BASIII/	No buffers available-program too large to load.
OVERFLOW ERROR	BUS BASIII/	Calculation result too large.
OVERFLOW ERROR	AS/II,II+,IIe	Value too large or too small to calculate.
PATH NOT FOUND ERROR	BUS BASIII/	Path nonexistent, file not on disk, misspelling.
PROGRAM TOO LARGE	DOS/II,II+,IIe	Not enough memory in RAM to load from disk.
RANGE ERR	INT/II,II+,IIe	Array and subscripts don't match.
RANGE ERROR	BUS BASIII/	Nonexistent line number or range for LIST or DELETE.
RANGE ERROR	DOS/II,II+,IIe	DOS parameter in command is out of permissible range.
REDIM ERROR	BUS BASIII/	New dimension tried for array which was already dimensioned.
REDIM'D ARRAY ERROR	AS/II,II+,IIe	New dimension tried for array which was already dimensioned.
REENTER	BUS BASIII/	Wrong type of data input.
RETURN WITHOUT GOSUB ERROR	AS/II,II+,IIe	More RETURN statements than GOSUBs in program.
RETURN WITHOUT GOSUB ERROR	BUS BASIII/	Same as Apple II series.
RETYPE LINE	INT/II,II+,IIe	Wrong type of data input.
SOS CALL ERROR	BUS BASIII/	SOS not understood by BASIC.
STACK OVERFLOW ERROR	BUS BASIII/	Too many FOR...NEXT statements or subroutines in program.
STR OVFL ERR	INT/II,II+,IIe	String input is larger than string dimension.
STRING TOO LONG ERROR	BUS BASIII/	String longer than 255 characters.
STRING TOO LONG ERROR	AS/II,II+,IIe	Same as Apple III and also tried to concatenate to length over 255 characters.
SYNTAX ERROR	BUS BASIII/	Wrong formula, illegal command, misspelled command.
SYNTAX ERROR	AS/II,II+,IIe	Same as Apple III.
SYNTAX ERROR	DOS/II,II+,IIe	Same as Apple III.
SYNTAX ERR	INT/II,II+,IIe	Same as Apple III.
TOO LONG ERR	INT/II,II+,IIe	Program line longer than 128 characters.
TYPE MISMATCH ERROR	AS/II,II+,IIe	Wrong type of variable entered.
TYPE MISMATCH ERROR	BUS BASIII/	Same as Apple II series.
UNDEF'D FUNCTION ERROR	BUS BASIII/	Reference in program to undefined function.
UNDEF'D FUNCTION ERROR	AS/II,II+,IIe	Same as Apple III.
UNDEF'D STATEMENT ERROR	AS/II,II+,IIe	Program tried to branch to wrong line or unnumbered line.
UNDEF'D STATEMENT ERROR	BUS BASIII/	Same as Apple II series.
VOLUME MISMATCH	DOS/II,II+,IIe	Incorrect volume parameter given with command.
VOLUME NOT FOUND ERROR	BUS BASIII/	Same as Apple II series.
WRITE PROTECT ERROR	BUS BASIII/	Tried to write to write-protected disk.
WRITE PROTECTED	DOS/II,II+,IIe	Same as Apple III.

ESC ESCape. Causes the terminal and/or processor to interpret subsequent characters differently. Escape codes are used to indicate a sequence of control messages in ASCII. For example ASCII 27 is an escape code to the EPSON dot matrix printer to interpret one or more following bytes as control information rather than data to be printed.

ESC Key The ESC (ESCape) Key is one of the control keys on the Apple computer keyboard. It places the computer in the Escape Mode or begins an escape sequence. The function of this key is to change the code signal generated by the key pressed in combination with the ESC key to allow multiple uses of keys.

Escape The use of CHR$(27) in a program line to send an ESCape to the computer or a peripheral.

Escape Codes Press the ESC key, release it, then press the second key (the ESC key must be pressed each time you use a sequence):

ESC-A	moves the cursor one position to the right.
ESC-B	moves the cursor one position to the left.
ESC-C	moves the cursor down one line.
ESC-D	moves the cursor up one line.
ESC-E	deletes all characters from the cursor to the end of the line.
ESC-F	deletes all characters from the cursor to the end of the screen.
ESC-@	clears the screen and moves the cursor to the upper left corner.

The ESC key can be used in an edit mode which requires the Autostart Monitor. Pressing the ESC key enters the edit mode. Exiting the edit mode is accomplished by pressing any key except I, J, K, M, SHIFT, REPT, or CTRL.

I	moves the cursor up one line.
J	moves the cursor one position to the left.
K	moves the cursor one position to the right.
M	moves the sursor down one line.

Escape From Arcturus* You control the Space Fortress and must fight off attacking Gremlims. Later you find yourself deserting Arcturus in a blitz of enemy landing craft. This is a fast action game that is played with paddle control or keyboard. Synergistic Software.

ESCape Key See ESC Key and Escape Codes.

Escape Mode The Apple III computer allows the user to move the cursor freely around the screen without altering the data in memory or the data in the input buffer by allowing use of the Escape Mode which is accessed by pressing the ESCape key prior to another key. This mode provides the user with powerful editing abilities. In addition to providing for free cursor movement, this mode also provides the ability to set the viewport, reset the viewport, clear part of the screen, and clear all of the screen. Similar features are available in this mode on the Apple II, Apple II+, and Apple IIe computers with the exception of the viewport commands.

Escape Mode Status The Console Driver command structure for the Apple III computer allows the user to enable or disable the Escape Mode by changing the value of Control Code 15 of the driver. If this code is set at $00, the Escape Mode is not available. If it is set to $80, this mode is available.

Escape Sequence A sequence of keypresses which begins with pressing the ESCape key. This sequence expands the ability of the computer keyboard to enable editing of material already entered.

ESC-A, -B, -C, -D Escape Mode cursor control commands. ESC-A moves the cursor right. ESC-B moves the cursor left. ESC-C moves the cursor down. ESC-D moves the cursor up. These editing mode commands move the cursor over the screen without removing data from memory or adding data to memory. These movements are intended to position the cursor to allow text to be corrected, added, or deleted with other commands. ESCape must be pressed simultaneously with each of these keys.

ESC-CTRL-Q A command for use with the Apple IIe computer which instructs the computer to turn off the 80-column text card in the auxiliary slot.

ESC-E, -F These escape commands clear lines and allow rapid erasure of specific lines or line segments. ESC-E deletes a line from the cursor to the right hand side of the screen. ESC-F erases everything from the cursor's position to the lower right hand corner of the screen.

ESC-SHIFT-P The Escape Mode command which clears the screen and homes the cursor.

Essential Math I* Seven programs of drill and practice lessons. Bertamax, Inc.

Essential Math II* Thirty programs of drill and practice lessons. Bertamax, Inc.

Essential Math III* Twenty-one programs of drill and practice lessons. Bertamax, Inc.

Essentials Disk* Use this disk to help you get your Apple started when you first bring it home. A keyboard demonstration, an introduction to BASIC, and examples of applications are included. Disk. Sterling Swift Publishing Company.

Estate Liquidity Analysis* An analysis program that helps you figure out the funds needed to settle an estate. The program can be used to analyze the needs of a business after the deaths of both partners. Apple II+; 48K. Insurance Micro Software, Inc.

Estate Tax Plan 1.2* Addresses problems in personal financial planning and is based on the recently enacted Economic Recovery Tax Act of 1981; an update service is available to keep the program current. This package addresses allowable deductions, disposition of assets, death tax liabilities, special deductions, bequests, etc. The user should be knowledgeable in estate planning to take full advantage of this program. 48K; 80-column printer. Aardvark Software, Inc.

Estate Valuation Analysis* Illustrates estimated savings in estate settlement costs that can be generated by an A-B Marital Trust. There is also a capital needs section that shows the estimated need for estate liquidity. Some assumptions are: 1) there is a marriage; 2) Death occurs ten years apart and no orphan exemption is applied; 3) Retirement plan value is paid in a lump sum and both retirement plan value and Life Insurance will be put into the trust; 4) Administrative and probate fees will be calculated at 6% of appropriate assets; and 5) the user of the program knows Estate Planning and A-B Marital Trust concept. RE/International Systems Corporation.

Estimator* Designed for project estimation and can be interfaced with KBS's Cost Accounting Program. Estimator can tailor itemized breakdowns to specific needs, estimate totals, and create a master project estimate. Kleinhammer Business Software.

ETB End of Transmission Block.

Ethernet A standard for inter-computer communications networks developed by Xerox Corporation.

ETX End of TeXt.

ETX/ACK Protocol See ENQ/ACK.

EUROMICRO European Association for Microprocessing and Microprogramming.

Evaluate* A three-program package which analyzes investments and cash flow. It compares present economics to predicted changes and has the ability to handle up to ten investment analogies. 48K; disk and printer. Investment Evaluation Software.

Even Parity A parity bit added to a byte or word that makes the total number of 1 bits even.

Everyman's Database Primer* Written by Robert A. Byers. The book features dBASE II*, but presents lucid general discussions of database managemnet programs, the hardware required to run these programs, and advice about setting up and using databases. Mr. Byers stresses the organization of information in databases and the value of presenting information in a way that makes it easy to find and use. He explains the common terms associated with databases and uses dBASE II to explain how to boot a database program, how to set up a database, how to enter data, and how to use the data which has been entered. Byers describes the careful planning that should precede starting a database, and also suggests various means of altering it if something has been left out of the original plan. His discussions of the procedures for using the programming, logic, and mathematical features of dBASE II are clear and useful. Meaningful examples illustrate each point. This book is an excellent guide for the person who is ready to begin using a database management system. Ashton-Tate.

Evolut-Evolution and Natural Selection* Uses the Pea Model to explain the concepts of natural selection and genetics. Students will increase their knowledge of alleles, heterozygotes, ecological habitats, and more. 48K. Conduit.

Examine Memory When the Apple II, Apple II+, and Apple IIe computers are in the system monitor for the purpose of Assembly language or Machine language programming or program editing, the computer user has the ability to examine the contents of a particular memory location or the contents of a range of memory locations. To enter the Monitor from BASIC, type:

```
CALL-151
```

followed by RETURN. Once you are in the Monitor, the computer will return the Hex value of the contents of a memory location any time you enter the HEX address of that location followed by RETURN. To instruct the computer to dump memory contents from a particular address to another address, you must have already examined the contents of an address with the sequence described above. If this has been done, enter the address of the end of the range you wish to examine preceded by a period. The computer will respond by displaying the contents of all memory locations which lie between the last displayed location and the address which follows the period. To see the contents of a memory address which immediately follows an address just examined, press RETURN.

EXCLUSIVE OR A logical operator used frequently in Machine language which carries out a branching or value replacement function when either of two operands are true, but does not execute the next step if both operands are false or both operands are true. For example, in plain English: IF John or Marsha comes home, call me. IF neither comes home, don't call me. IF both come home, don't call me.

EXEC A DOS 3.3 command which instructs the computer to load a text file and run it as a program. This command opens the file to be used. It then places the program pointer at the beginning of the file and READS the information into the computer by converting its contents into INPUT statements. To make the program run, it must contain a RUN statement at the end. To convert a program listing into a text file which can be EXECed, use the MAKE EXEC program in the DOS 3.3 Manual. This example must be changed to suit your program name, but it works very well.

Executable File In CP/M, executable files are those that contain executable programs. Such a program must be in HEX or must be converted to HEX to run. A comand (.COM) file is such a file.

Execute BASIC Program See RUN and LOAD.

Executing Machine Language Programs If you are in the System Monitor and have just completed a Machine language program, you may wish to run it. If so, type:

```
300G
```

followed by RETURN. This will execute the program.

Execution, Deferred Used to refer to the information, commands, and statements which constitute a program, and which will be executed only when the program is run. A list of those commands which will operate only in this mode is shown below:

INPUT
DEF
ONERR
GET
ON...GOTO
GOTO
DATA
ON...GOSUB
RESUME

Execution, Immediate Some commands or statements in BASIC may be used directly from the keyboard and do not have to be a part of a program. Typing the command and then the RETURN key will execute the command. The most often used of these commands include RUN, PRINT, LIST, LOAD, AND HOME. A list of commands that will operate only in the immediate mode is shown below.

CTRL-C
ESC-B
REPEAT (APPLE II/II+)
ESC-I
CTRL-RESET
ESC-C
CTRL-X
ESC-K
ESC-A
ESC-D
ESC-J
ESC-M

ESC followed by A, B, C, D, I, J, K, or M is used to move the cursor (q.v.) when editing on the screen. See Execution, Deferred.

Execution Time The time required to execute an instruction, including fetch-decode-execute. Also used to refer to the point in the processing of a program when it is given control of the CPU, as contrasted with compile time, link time, and load time.

Executive Briefing System* A tool for creating professional visual presentations. Features custom-designed fonts, a special slide compression technique, special effects, printer drivers for Epson, Integral Data, and Silentype printers, hi-res colors. Supports the color IDS Prism Printer. Lotus.

Executive Briefing System (EBS)* A graphic display program that uses most of the graphics capabilities of Apple II/II+. There are two parts. The first is an edit module that creates computer slides. The second permits you to show these slides on the screen using text, lines, circles, and color. There is also a choice of three type fonts in four styles (upper and lower case). You can show data in three ways: automatically, manually, or a combination of the two. 48K. Professional Software Technology, Inc.

Executive Fitness* A visual display of exercises designed to give vitality to the working person. First, watch the exercise completed, then perform the workout yourself. Monument Computer Service.

Executive Secretary, The* A complete package of useful office programs to make life easier for the manager or secretary. Typing, filing, mail files, document printing, and many other general editing and record keeping procedures are included in these programs. Aurora Systems, Inc.

Exerciser A test system or program designed to detect malfunctions in memory, disk, tape, or other device, prior to shipping to customers, or during a maintenance operation.

EXFN In Apple III Business BASIC, the EXFN command runs a Machine language program external to the program currently running. This Machine language program enters a value into the currently running program. This particular command produces a real number. It is executed by an INVOKE statement such as PRINT.

EXFN% In Apple III Business BASIC, the EXFN% command produces the same result as the EXFN command except that the result produced by the EXFN% command is an integer rather than a real number.

EXP An Applesoft function which returns the natural logarithm "e" raised to the power shown in the parentheses which follow the function command. For example:

EXP(3)

produces 20.0855369 as its result. This function is available on Apple III Business BASIC.

Expand-A-RAM A memory expansion card providing an additional 64K of plug-in RAM for the Apple II, Apple II+, and Apple IIe computers. It is provided with software called RAMDISK for Apple DOS, Apple Pascal, and CP/M. This software emulates a floppy disk drive. Depending upon the application, file access is two to ten times faster than access with a floppy disk drive. This card may be plugged into any slot in the Apple; it works with much of the software which seeks memory expansion in slot 0. A version of this card called Expand-A-RAM/80 is available for the Apple IIe. This particular card produces an 80-column display in addition to providing 64K of memory expansion. Prometheus Products, Inc.

Expanded Notation* Graphic numbers and letters are used to enhance skills in expanding up to the thousand field. Consists of ten lessons. 48K. Hartley Courseware, Inc.

Expansion Board All Apple computers were built with connection slots at the rear of the computer's main board to accomodate control cards for peripheral devices, memory expansion boards, and video display enhancement boards. The boards which are inserted into these slots are called Expansion Boards. Each such board contains one or more IC chips, printed circuitry, and sometimes another microprocessor chip which takes over the operation of the Apple computer.

Expansion Chassis* This device provides eight additional slots for your computer as if you had fifteen peripheral cards on line. This extra power is compatible with a wide range of Apple software and most non-Mountain Computer peripherals. Mountain Computer, Inc.

Expansion Pac-I* A three-program package designed to draw and color graphic shapes. Chemists architects, plumbers, or landscapers will find this a handy tool in constructing tables with any of the 350 standard shapes. 48K; VersaWriter. Versa Computing, Inc.

Expansion Pac-II* Includes ten very efficient graphic commands. These will allow the user to shrink images, merge two screens together, create different colors, and much more! 48K; VersaWriter. Versa Computing, Inc.

Expansion ROM The Apple II computer has 2K of space reserved in its memory for access from a peripheral controller card or firmware card. The purpose is to store Machine language commands or routines which assist in supporting the operation of the device operating from the controller card. The address of this RAM space is $C800 to $CFFF. The same provision is made in the Apple IIe computer to provide support to device control and communications.

Expansion Slot A slot at the rear of the Apple II, Apple II+, and Apple IIe main computer board which allows the connection and operation of devices, video enhancement boards, memory expansion boards, modem controllers, etc. This particular feature of the Apple computer provides the user with all sorts of capabilities which are not built into the original computer. The expansion slots are wired into the 6502 microprocessor chip which allows data to flow to the chip and commands to flow from it. The Apple II and Apple II+ computers have eight such slots numbered from 0 to 7. The Apple IIe computer has one super slot for combined memory expansion and video display expansion to eighty columns. This computer also has six regular expansion slots similar to those in the Apple II and Apple II+ computers. The Apple III has four peripheral slots in a well at the rear of the computer.

Expediter II+* A compiler which is intended to combine the ease of Applesoft programming and debugging with the performance of assembler. This system is designed for the beginning as well as professional programmer. Some of the benefits are two to twenty times faster program execution time and keeping memory requirements at a minimum. Just load your Applesoft program and Brun Expeditor; a complete symbol table lists variable names, memory addresses, string sizes, and array dimensions. Sierra On-Line Systems.

Experiencing BASIC Duplicating Masters No. 7412* A good addition to any beginning BASIC programming course. Included are worksheets and tests. Milton Bradley Educational Software.

Experiencing BASIC Task Cards No. 7396* Use this set of thirty cards to help students learn BASIC programming. Included are special stands to facilitate easy reading at the keyboard as the students enter simple programs into the computer. Milton Bradley Educational Software.

Experimenter's Package* Gives the musician or educator access to the Machine language interpreter that produces MMI sound and graphics. With this package, the teacher can tailor tutorial programs to the needs of his students. 48K; Micro Music, Inc.

Exponential BASIC. See EXP.

Expressions A combination of variables and mathematical operators which expresses a relationship between what is known and what is unknown. The sum or product of two or more numbers may be unknown prior to performing the operation. One or more of the variables may be unknown prior to performing one or more mathematical operations. Mathematical expressions define the unknowns and the knowns and the operations which are to be carried out. Expressions may be arithmetic, Boolean (logical), real, or relational.

Expressions, Arithmetic Arithmetic expressions define relationships in terms of real numbers, integers, or long integers (on the Apple III). They use mathematical operators (+, -, *, /) and one or more known or unknown elements called operands. Typical arithmetic expressions are: 1 + 12 -(10/3) or X -Y + Z.

Expressions, Boolean Boolean expressions involve "true" and "false." Boolean operators are AND, OR, and NOT. Each of these operators dictate the outcome of a bit set in one of the computer's registers or the next action to be taken by a program. AND requires that both conditions in a statement be true prior to performing the task assigned to "true." For example, in the expression

IF A = 2 AND B = 12 THEN GOTO 125

both conditions must be met prior to branching. OR requires that one of two conditions in a statement be true prior to performing the task assigned to "true." For example, in the expression

IF A = 3 OR A = 9 THEN GOTO 125

the branching would take place if A was equal to either number. A distinct expression called the EXCLUSIVE OR is supported by computers in Machine language. This type of expression requires that only one of the two conditions separated by the OR be met prior to performing the task assigned to "true." For example, in the expression

IF A = 12 OR B = 11 THEN GOTO 1000

action will take place only if A = 12 or B = 11. No action will occur if A = 12 AND B = 11. NOT requires that a false condition exist prior to performing the required task.

Expressions, Real Expressions using real (floating point) numbers are called real expressions.

Expressions, Relational Expressions which compare elements are Relational Expressions. These expressions use logical operators (>,<,=,=<,=>,≠) to test existing conditions. > means greater than. < means less than. = means equal to. =< means less than or equal to. => means greater than or equal to. ≠ means not equal to.

Extended Arithmetic The Apple III is capable of performing arithmetic functions on extremely large numbers by using the CON% command to return a result of an operation as a long integer. These numbers may have up to nineteen digits.

Extended 80-Column Text Card The Apple IIe computer normally displays 40 columns of text on screen. This computer can be given the ability to display eighty columns of text by installing an 80-column text card in one of the computer's auxiliary slots. The computer will also accept an 80-column text card which contains an additional 64K of expansion RAM.

Extension In CP/M, the type or function of a file may be defined by adding a three letter extension to the end of the file's name. For example:

LOADER.COM

indicates that the file LOADER is a command or transient command file which the computer will execute to accomplish a programmed task. Common CP/M file extensions are listed below:

EXTENSION	MEANING
.ASM	File is a program written in Assembly lang.
.BAS	File is a program in BASIC source code
.BAK	File is a back up of another file
.COM	File is a transient command file
.HEX	File is a Machine language (hex) program
.INT	File is a compiled BASIC program
.PRN	File contains a listable Assembly language program
.$$	File is a scratch file

Extent This term is used with database managers and with CP/M files to define a specified file capacity or length. Extent is dictated by file size and memory capacity. If there are five fields (discrete data elements) in a file, and each field is five characters in length, the file size is twenty characters. If the available memory can only handle 1000 characters, the extent of this file is said to be fifty entries.

External Device An external device is any device which can be utilized by the computer for input or output of data. Apple II and Apple II+ computers utilize peripheral interface cards installed in the expansion slots in the main board of the computer to access such devices as printers, modems, analog devices, disk drives, hard disks, etc. These computers are equipped with a game input/output socket inside the computer. Video interface with a monitor is via an output plug at the rear of the computer case. Video interface with a standard TV set is accomplished with a radio frequency modulator which is connected inside the computer. The Apple IIe is equipped with slots similar to those on the Apple II and Apple II+. All three of these computers have a cassette input plug and a cassette output plug on the rear of the computer case. All other devices except monitors and game devices are connected via controller cards plugged into internal sockets. The Apple III computer is equipped with two joystick input ports, an RS-223C serial interface port, a color video port, a b/w video port, and an audio port. Disk drives are connected via an external connector port. All other devices must utilize peripheral controller cards plugged into internal slots.

External Memory All Apple computers utilize external devices to store programs and data. These devices range from tape recorders to hard disks. The most common device utilized for data and program storage is the disk drive. A motor rotates a thin, circular, magnetically sensitive disk at a high speed which allows magnetic heads like those on a tape recorder to write data to the disk and read data from the disk. All external memory storage devices are somewhat slower than direct access to the computer's memory, but their value lies in the amount of data which they can store and the methods used to LOAD to the computer and to SAVE data from the computer.

Eye, The* This is a complete security system for your home or business. It will detect unauthorized entries and sound an alarm (as well as record the time). The software package also allows you to program your computer to turn on (or off) lights, radios, fire or burglar alarms, or a variety of devices, including your coffee pot in the morning. Three detection circuits operating independently of each other give the user flexibility in adapting the system to his needs. The circuit board, software, piezo electric alarm, and four magnetic entry switches are included. Lehigh Valley Computer Corporation.

E-Z Draw* A completely rewritten program that includes the Higher Text character generator. Features font manipulation, expansion, and compression. Pictures can be mixed together or you can save a portion of the screen on the disk. Fully keyboard controlled. Sirius Software, Inc.

E-Z Draw 3.3* This graphics utility program has the advantage of being able to change from graphics to text when desired. It is documented in a progressive manner and allows duplication of figures for other hi-res screens. 48K. Sirius Software.

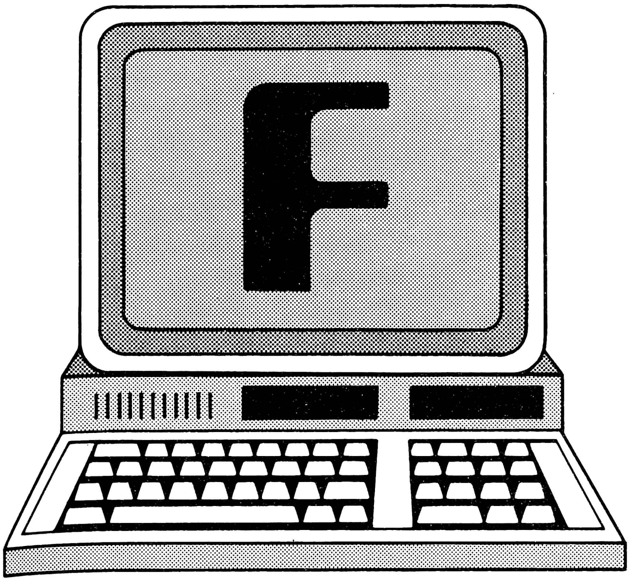
E-Z Graf* Uses DOS on an Apple II. This graphing program uses the Cartesian coordinate system and accepts any numerical data in the x,y form (positive or negative, integer, or real). Data can be saved on disk. 48K. Unidata, Inc.

EZ-Invoice 1.0* Lets you edit, save, or print invoices. The forms are user-designed so comments may be included if you wish. 48K and printer. Highlands Computer Services.

EZ-Ledger* A record keeping system for small business that allows bookkeeping in income or expense codes. Offers a strictly cash system, invoicing, tax deductions, and accounts receivable/payable files. 48K; Applesoft; DOS 3.3. Highlands Computer Services.

E-Z PILOT* Uses a total of ten instructions to present material to students. It is combined with the program Author, which designs the test material to be presented. 48K. Teck Associates.

E-Z Typing* Designed to help you with your typing skills. It starts by showing you the proper finger placements and then lets you practice typing home row letters. From there, you progress to typing phrases and then texts. You can even choose the text you wish to work with. Recommended for the fourth grade and up. Teck Associates.



F Codes. ASCII = 70, HEX = 46. f—ASCII = 102, HEX = 66.

F Flag. Also, Finish in BNPF code; or the hexadecimal symbol for decimal 15—the largest hexadecimal digit.

F The letter F is used in CP/M during file copying operations employing the PIP command to filter out line feeds which may be included in the file being copied. This letter must be included in brackets immediately following the file name included in a PIP expression.

Facemaker* An educational program designed to teach children between the ages of four and eight how to use the keyboard, while enhancing their memory skills through the use of graphics and sound. 48K. Spinnaker Software.

Fact Fun* Similar to Word Fun*, this program uses text files on disk to store questions and multiple-choice answers. The novice programmer can change the questions; any that are missed will be repeated. Computer Stations, Inc.

Fact Sheets* A worksheet generator for educators who write tests based on math operations. The program creates worksheets and answer keys that are generated from teacher-selected categories. Requires a printer. Hartley Courseware, Inc.

Factoring* Menu-driven program to teach factoring of single-variable polynomial expressions of degree two. The four areas of the program are: The Distributive Property; The Factoring Game; The Scheduled Quiz; and The Factoring Machine. Disk. Micro Power & Light Company.

Factoring Whole Numbers* Young students can quickly master the fraction system with these twelve programs. They will learn how to calculate exponential equations, most and least common denominator, and more! A teacher's manual is included. 32K; 48K; disk. Quality Educational Designs.

Fairchild Major semiconductor manufacturer—oldest in Silicon Valley (between San Francisco and San Jose, California).

Families of Atoms* Discusses the periodic table and its elements, periods and families, valence electrons, and alkali metals and halogens. 48K. J & S Software.

Family Bible Fun* The program requires two diskettes which are packaged separately. The Apple Master disk is needed to install the particular DOS system which is used for these games.

In Know Your Bible II, there are six games: Vowel Out, Wordsearch, Multiple Choice Test, Matching, Scrambled Text, and Cryptogram. For Vowel Out, Scrambled Text, and Cryptogram, the same set of six memory verses concerning creation are used. The Vowel Out choice may be played with spaces between words or not; the Scrambled Text allows you to scramble letters within words only, or scramble the order of words in the sentence. Of these three games, Cryptogram is the most fun; it is sort of like hangman, without the penalty for wrong guesses. In the Word Search game, you may specify how large the grid is to be (up to 14 by 14), and how many words should be hidden (up to twenty). If you specify too small a grid, you will not be able to fit twenty words into it. Other disks in the set include: Know Your Bible I, Life of David, Life of Christ I and II, and The Prophets. Home Computer Software (distributed by Sparrow Distribution).

Family Budget Analysis* Analyzes information on monthly income and expenditures in order to figure out your budget. Also compares your family's economic statistics with the national average. RE/International Systems Corporation.

Family Financial Planner* Six programs that will help families with mortgage payments, investment programs, college savings, and other complex calculations. Disk or cassette. Soft One.

Family Records Temp—A VisiCalc Template* Lets you enter formatted records that can be changed without setting up an entire database. Home and personal property inventory, tax submission summaries, insurance records, school records, and medical records are some of the things you can use this program for. Exec Systems.

Family Roots (Lineage Program)* A geneology package. Six programs are included: 1) Edit—stores basic family information; 2) Search—can locate any piece of data that you request; 3) Text—is a system for storing notes; 4) Charts—has two pedigree charts and a chart of descendants; 5) Tables—has data for one person printed in a single page format; 6) Lists—prints an alpha/numeric list of names; 7) Utilities—renumbers personal ID numbers, prints blank charts, and generates address lists. 48K. Quinsept, Inc.

Family Security Needs Analysis (FSNA)* Project and calculate your family's financial needs with this estimating program. Input total income, insurance and tax requirements, etc. to generate investment potential or savings amount. RE/International Systems Corporation.

Fancy Border* Provide the name of your program, and a border pattern of three alphabet patterns are worked around the edge of the screen spelling out the title of your program! Applesoft. Paul's Electric Computer.

Fan-Fold Paper Continuous sheets of paper joined along perforations and folded in a zigzag fashion. Often used with printers because it can be continuously fed and folded without operator assistance.

Fan-In An electrical load presented to an output by an input.

Fan-Out The electrical load that an output is capable of driving. Ordinarily expressed as the number of inputs that can be driven from a given output signal.

Farad The unit of electrical capacitance. A 1 volt per second change in voltage across a 1 farad capacitor will require 1 ampere of current flow.

Farm Management Decisions* Assists with managerial decisions related to land and equipment purchases as well as grain sales. The five programs include one for calculating interest costs incurred in storing grain. The second program calculates the cost of farm equipment, stock, and property ownership. The third determines the cash availability requirements for specific land purchases and financing methods. The fourth calculates cost per acre and period of time to own farm machinery. The fifth determines the selling price necessary to cover grain drying and storing expenses. Decision Data, Inc.

Farm Records* A series of integrated programs in the form of a single-entry bookeeping system. The five programs include a Tax Forecaster for anticipating taxes due and determining the outcome of various expansion and production strategies; a Net Worth program to calculate assets and liabilities and generate a net worth statement; a Loan Amortizer for tracking loan amounts, payments, and interest rates; a Depreciation program for recording equipment purchases and calculating tax credits and depreciation; and finally, an Income/Expense record for generating profit and loss statements, transaction records, and an audit trail. Agricultural Management and Economic Consulting.

Fast Facts* Plan your future investments effectively. You can put money away for retirement or for the children's education, and it takes inflation and loan payments into consideration before creating investment plans. 48K. Richard Lorance & Assoc., Ltd.

Fast Fourier Transform Application of the Cooley-Tukey algorithm to Fourier transforms. Allows computation of Fourier transforms with dramatically reduced time and storage requirements.

Fastmath I* A mathematics drill for two elementary school students in kindergarten through second grade. The program provides drills in addition, subtraction, and mixed addition and subtraction. 32K; DOS 3.2 or DOS 3.3. NTS Software.

Fastprint Driver When the Apple III system is being configured using the System Configuration Program, there are a number of printer driver options available to the user. One of these, the Fastprint Driver, sets the system to communicate with a high-speed line printer rather than a slow-speed letter quality printer.

Fatal Error A condition occurring during the execution of a program which requires termination of the program.

Fault-Tolerant A program or system capable of correct operation even when one or more of its components have failed. Also called error-tolerant, or fail-soft.

FCB File Control Block. Used in CP/M to describe the individual file descriptions contained in a diskette directory. See File Control Block.

FCC Federal Communications Commission.

FCM* A database especially designed with a mailing list which is used to create form letters, print out envelopes, and update previously created mailing lists. It may be used to create a filing system for almost any kind of information that is useful for a mailing list. Through the use of the system utilities, you may edit these field names to suit your own purposes.

The default operation method is geared toward a system with one disk drive. If you have two, you will need to configure your program to recognize both drives. In this case, the program will automatically assume that you have a data disk in Drive 2. You need an initialized disk to save data.

When designing your own form, you may have up to ten fields with the other fields "inactive." The maximum number of characters contained in all the fields is 132. As you are designing the form, the number of characters which you have allowed is totalled at the bottom of the screen; if you exceed the limit, you may go back and redesign the form before saving it to disk.

The print options include printing part or all of your list, printing labels, and printing envelopes. You may also use special type fonts if your printer will support them. The form letter option allows you to use a letter format (previously saved on a word processing data disk) with the information from your FCM files, to enter information such as the date, salutation, first and last names, closing, the printed form of your name under the signature, your title, and any initials that would be included by the user when typing an individual letter. Continental Software.

FD Floppy Disk.

FDC Floppy Disk Controller.

FDM Frequency Division Multiplexing. A technique that helps to carry data from a number of terminals simultaneously by dividing a high bandwidth into several narrow bands of lower frequency.

Feedback One or more outputs of a system. Also used as an input in a control loop.

Feeder* Helps you decide what to feed your cattle by calculating the cost of feed per pound of weight gain, and the net return at a given market price, as well as break-even buying and selling price. Agricultural Management and Economic Consulting.

Feeder Pig Production* Takes into account the variable and fixed expenses of producing feeder pigs for sale while determining overall profit and the return to management. AG-COM.

Fertilizer Formulation* Determines the application cost for the volume of fertilizer required to produce a desired nutrient yield with the six most popular dry and liquid fertilizers. AG-COM.

Fertilizer Recommendations Package* Contains professional recommendations (from a variety of sources) for the use of a variety of fertilizers. A companion program is included for the user to customize his own local uses by selectively incorporating data from the professional advice database with his own data. Financial Systems, Inc.

FET Field Effect Transistor. Pronounced "fett." A tiny, low-power transistor, such as a MOS (Metal Oxide Semiconductor), which goes into building integrated circuits.

Fetch The first cycle in the fetch-decode-execute sequence of instruction execution. During the fetch cycle, the contents of the program counter are placed on the address bus, a read signal is generated, and the instruction pointer is incremented. The data bytes arriving from the memory, i.e., the instruction which has been fetched, will be gated into the instruction register of the control unit. Some machines have a "fetch ahead" strategy that gets upcoming instructions before they are needed during slack memory cycles.

FF Flip-Flop. Also, Form Feed, which is a control character used with printers to advance the paper so the top of the next sheet, or the next form, is in the correct position for printing.

FFFA On the 6502 microprocessor in the Apple II and Apple II+ and the 6502B microprocessor in the Apple IIe, this monitor address is used to call a non-maskable interrupt (NMI). See NMI.

FFFB On the 6502 Microprocessor in the Apple II and AppleII+ and the 6502B microprocessor in the Apple IIe this monitor address is used for NMI/256. See NMI.

FFFF The hexadecimal representation of the maximum simple address value on 8-bit microcomputers: FFFF base 16 = 65535 base 10 = 177777 base 8 = 1111111111111111 base 2.

FFT Fast Fourier Transform. A fast computational algorithm for determining the Fourier curve fit to a collection of data points.

Field A logical grouping of data. It could be a group of related characters in a record (name field); a work area in memory; or, in the CPU, a zone within an instruction, such as op code, address, or comment.

Field & Crop Records System* A system designed for maintaining complete records on a per field basis. Information categories include the variety of the crop planted, fertilizers and other chemicals applied, the yield produced and stored, rainfall levels, field notes and more. Computerized Farm Information Systems, Inc.

Field Companion, The* Keep track of the time you spend with clients. You can evaluate the time for billing or expense accounting. Data fields are user-defined and manipulated. All files can be printed and or sent, via phone modem, to the main office for processing. Requires 56K RAM with DP/M or 128K RAM with CP/M-86. Digital Marketing.

Field Population* The user inputs the number of plants per row to calculate the total field population or vice versa. AG-COM

Field Size* A program using length and width dimensions to calculate a field's total area in acres. AG-COM.

Field Trip List* A variation on the Attendance program, this is a system to keep track of students going on field trips. With the use of class files, lists of individuals can be compiled indicating who will attend a specific trip. Disk Depot.

FIFO First-In-First-Out structure. Pronounced "fifo." Data is added at one end and removed from the other, like cars lined up at a gas station. A FIFO buffer is used to connect two devices operating asynchronously at different speeds. Each device is connected to one end of the FIFO buffer.

File A logical grouping of information which is given an identifying name and is considered a unit by a user. A file may be divided into records, blocks, or other units as required by the memory device.

File—CP/M Program A program file contains some type of program instructions specifying how data is to be processed. If you write a BASIC program called SAMPLE.BAS; this is a source program. If you then submit it to the BASIC compiler to produce a fast object program, the BASIC compiler will treat SAMPLE.BAS as its input data rather than as a program to be executed. The BASIC compiler will produce an object file with the extension .OBJ containing a translation of your source program into Machine language.

A BASIC source program looks more like a document text file than like an executable program (.COM). So it is how a file is used (or usually used) that determines whether it is a data file, a program, or in the case of a source program, sometimes one and sometimes the other. See Program, Source; Program, Object; Executable File; Command File; BASIC Interpreter; and BASIC Compiler.

File—Delete or ERASE CP/M command to delete or erase one or more files. ERASE is an internal command: and is part of COMMAND.COM. The basic format is:

```
ERASE <filespec>
```

The <filespec> can optionally specify the drive, file name, and extension.

Example:

```
ERASE B:FILE2.TXT
```

You can use the global characters ? and * to erase multiple files. Do this carefully! If you specify

```
ERASE *.*
```

all files (except hidden files [q.v.]) will be erased. In this case, DOS will ask:

```
Are you sure (Y/N)?
```

Answer N if you really didn't want *all* files erased and want to cancel the command as entered. Answer Y to continue with the command.

File—Erase from BASIC See KILL.

File—Kinds and Extensions. This word is used in two different ways in computer literature. In the context of DOS and diskettes, it means information stored on a diskette; the contents could be data, a BASIC program, or part of CP/M or a batch file (.BAT) of prepared CP/M commands. File is also used to refer to a collection of data, such as a payroll file with information concerning employees, regardless of the medium on which it is stored. When used in this way, file is short for "data file."

For diskette files, the extension of a file name (one to three letters after the period) tends to tell you what kind of file it is:

ASM	Source program for the Macro Assembler
BAK	Backup file before changes made by WordStar and other programs.
BAS	BASIC source program
COM	Command file used by CP/M
DOC	Text format, documentation file
HEX	Hexadecimal data in ASCII representation
INT	An intermediate (compiled) BASIC file
LST	Program listing from Macro Assembler

PAS	A Pascal file
PRN	A listing file for a program which is in Assembly language
REL	A relocatable file written in binary code
SUB	A file that contains the CP/M operating system
TMP	Temporary file created by system programs
TXT	Text or documentation file
$$$	Temporary extension used by WordStar* and other programs for the modified file. It is renamed to the extension you gave your file when the editing process is ended

See Program, Source; Program, Object; and detailed entries by each extension.

File—Length of in BASIC See LOF.

File—Lock The Dos Command "LOCK File Name," will prevent you from accidentally writing over a file. The format, in the immediate mode, is:

LOCK <file name>

After this, the CATALOG listing will show an asterisk to the left of the file name and specifications. The converse command is "UNLOCK File Name," which you must use before you can alter the file on disk. You may read, RUN, and LIST locked files, but may not write them back to the disk. If you attempt to do so, you will get the error message "FILE LOCKED."

File—Temporary Extension $$$ is the temporary extension used by WordStar and other programs for the modified file. It is renamed to the extension you gave your file when the editing process is ended. See File—Kinds and Extensions.

File—Unlock The format, in the immediate mode, is:

UNLOCK <file name>

See File—Lock for a more detailed discussion.

File—.ASM A CP/M file extension used to identify a file written for conversion to Assembly language by a Macro Assembler.

File—.BAK .BAK is the extension for a backup file produced by WordStar* and some other programs, before changes are made. If the edit fails, the original data can be retrieved from the .BAK file. If the edit succeeds, the .BAK file is deleted. See File—Kinds and Extensions.

File—.BAS .BAS is the file extension for a BASIC source program. Keep in mind that BASIC programs are not executed as programs by DOS. They are interpreted as source code data by the BASIC interpreter, which is itself a program (.COM extension) being run by DOS. See BASIC Interpreter. See Program, Source; Program, Object; and File—Kinds and Extensions.

File—.COM .COM is the extension for a command file used by DOS or other directly executable programs. An executable program must have an extension of .COM or .EXE. The difference is that .EXE files must be processed by the DOS program loader to "relocate" a number of addresses for the specific memory address that the program will occupy. This must be done every time the program is loaded into memory and run, and is rather time consuming.

Keep in mind that BASIC programs (.BAS extension) are not executed as programs by DOS; they are interpreted as source code data by the BASIC interpreter, which is itself a program (.COM extension) being run by DOS. See BASIC Interpreter; Program, Source; Program, Object; and File—Kinds and Extensions.

File—.DOC .DOC is the file extension for a text format or documentation file.

File—.HEX .HEX is the extension for a file that contains hexadecimal data in ASCII presentation. See File—Kinds and Extensions.

File—.INT A CP/M file extension used to identify a file that contains a compiled (intermediate) BASIC program.

File—.LST A CP/M file extension used to identify a file that contains ASCII data for listing.

File—.PAS The CP/M file extension for a file written in Pascal.

File—.PRN A CP/M file extension used to identify a file that contains an Assembly language program for listing.

File—.REL A CP/M file extension used to identify a file that contains relocatable binary data.

File—.SUB A CP/M file extension used to identify a file that contains the CP/M operating system.

File—.TMP .TMP is the extension for a temporary CP/M file created by system programs. These files are usually deleted upon completion of listing or other system processes. They may appear on your diskette after failure to link successfully; this may be caused by lack of diskette or memory space, I/O or parity errors, or other problems. See File—Kinds and Extensions.

File—.TXT .TXT is the CP/M file extension for a text or documentation file.

File, Data A CP/M file which contains data to be processed by a program. This is a matter of function rather than contents. For example, suppose you write a BASIC program called SAMPLE.BAS. This is a source program. If you then submit it to the BASIC compiler to produce a fast object program, the BASIC compiler will treat SAMPLE.BAS as its input data rather than as a program to be executed. Also, when you list a program with TYPE, TYPE will treat the program as more data.

A BASIC source program looks more like a document text file than like an executable program (.COM). So it is how a file is used (or usually used), that determines whether it is a data file, a program, or in the case of a source program, sometimes one and sometimes the other. But in general, a program file contains some type of program instructions specifying how data is to be processed, while a data file contains the data that will be processed.

File, Executable See Executable File.

File, Text A CP/M file containing character data, letters, numbers, or special characters. These files may have any file extension. By contrast, an object file, such as the .COM and .EXE files, may contain data which is not displayable as characters. Most data and programs that you write will be in text files. See Data File.

File Attribute In CP/M, file attributes are used to define the type of file being written. Each file can have a "directory" attribute and a "read/write" attribute. If the file's directory attribute is "directory", this file will be listed with the DIR command. If the file's directory attribute is "system", the file will not be listed with a DIR command. If a file's read/write attribute is set to read-only, the file cannot be deleted or written to. There are overrides available to the user which instruct the system to ignore these attributes. PIP can be set to ignore these attributes with a Gn, a W, and an R parameter enclosed in brackets after the file name in the PIP statement.

File Control Block—CP/M In CP/M, each file listed in the disk directory has key information (regarding the file and its make-up) stored in a file control block. CP/M files can only be 256K in length. A file control block is generated for each 16K portion of a file. The file control block is made up of the file name (which is limited to a length of eight characters), the file type (which is three characters long), the disk drive designator for the file, the file extent, the file's record count, the position of the file on the disk, and the next record number to be read from or written to the file.

File Control Block—DOS An area of memory used by a disk operating system to keep track of a file's status. It keeps track of information status (input, output, or update), current record, physical sector numbers, etc.

File Fix* A utility program that offers file protection, recovery, deletion and renaming. File Fix permits password coding of files, text file scrolling, file copying, and verification. It also gives dumping and memory location branching. Digital Marketing.

File Handler Software See Advanced Data Handler; Advanced Dewey Decimal System; Datalock; Designer Picure Series; Disasm/65; Lexicom; Mag Files for the Disk II; Magazine Files; Mailing Label and Filing System Adjunct, The; Mailing Label and Filing System Supplement, The; Marching Band Database; MasterPlanner; MergeCalc; Sales Invoicing; Scroll Control; S-C Macro Assembler; Scheduling Package; Security Plus; Single Disk Sort; Soft-Step; Super Checkbook III; Super Sort; Super Sort & Search; Supersort (Rev. 1.5); VisiBlend; VisiCAIDS; 6502 Disassembler; 6502 Macro Assembler.

File Handling Commands—Apple III File handling commands in SOS on the Apple III computer are available on the utilities diskette's Main Menu by pressing the letter "F" for File Handling Commands Menu. The menu offers the option of listing the files on the disk, copying the files from one disk to another, deleting files, renaming files, making a new subdirectory, setting or unsetting write-protection, and setting prefixes. This system of command is called the Filer.

File Management File management, a.k.a. disk maintenance, includes creating files, finding them by name, insuring that adequate free space is available on the diskette, maintaining backups, and deleting files that are no longer needed. These tasks are supported by the various DOS functions, but thoughtful planning is still necessary to insure proper results.

Some DataBase Management Systems (DBMS) attempt to automate part of this work by maintaining files of the control and tracking data.

File Management System A group of programs designed to format and manage user files in a transparent way. The system allows symbolic names and attributes, and manages the physical allocation of storage. Usually part of the operating system.

File Menu When the File Handling Command Menu is accessed by the Apple III utilities disk, the menu which is displayed is called the File Menu.

See File Handling Commands—Apple III for the list of options offered by this menu.

File N Empty CP/M message produced by COMP. Either the first or second file to be compared contains no valid data.

File Name CP/M. A CP/M file name is one to eight characters in length. It may be preceeded by an optional drive letter (separated by a colon). Also, an optional one-to three-character file extension may follow (separated by a period). The entire specification for a file consists of the three parts—(drive):(file name).(extension). It is often called a filespec in documentation.

Example:

A:COMMAND.COM

Only these characters are allowed:

A-Z 0-9 $ & # @ \ — %
‘ ( ) — > [ ] | ’ !

An extension may use the same characters as those allowed in a file name in its one-to-three places. CP/M needs the extension of a file name (that has an extension) in order for it to find the file.

If any character other than those listed is used in either the file name or extension, CP/M thinks the character is a separator. The file name is truncated from that point and will not be found correctly.See File Names—CP/M.

File Name—Wildcard Characters In CP/M file names, ? and * can be used as special global file name characters to allow matching a whole group of files (or one file from a partial specification). ? means any single character occurring in this position is considered a match; thus ABC? will match any four character file name starting with ABC, including ABCA, ABCZ, ABCS, etc. * indicates that from this point on in the name, any characters (including blanks or none) are considered a match. So ABC* matches everything ABC? matches, plus all longer file names starting with ABC. The file ABCDE will match ABC*. but not ABC?

The file extension is considered a totally separate match, with ? and * used in exactly the same way as in the file name. Global file name characters can be used in many CP/M commands including COPY, DIR, ERASE, etc. Global file name characters are not allowed in a command name. They may only be used in command parameters.

File Name Extension Synonym for extension. Can contain up to three characters after the "." in a CP/M file name. The extension tends to specify the type of file. See File—Kinds and Extensions.

File Names—Apple III Business BASIC File names on the Apple III are arranged into directories and bear local names. Local names may have up to fifteen characters, may not begin with numbers, and may not contain spaces or apostrophes. Rules that apply to Apple III file names apply to files used by Apple II Business BASIC.

File Names—CP/M CP/M files may consist of eight letters followed by a period and a three letter extension. The extension identifies the file type and makes listing in a directory by type possible. If the user tries to save a file on a disk which contains a file with the same name as the file being saved, the file on the disk will be erased and replaced with the file being saved.

FILE NOT FOUND The file name entered in the command does not exist on the diskette in the default or specified diskette drive.

File Number The Apple III allows the user to open as many as ten files from a program to read or write data or text. This feature requires that each opened file be designated by number as well as by name. The OPEN# command is used to accomplish this operation. It must precede the file number and the file name, and must also precede any file handling commands such as INPUT or OUTPUT. If the same file number is used twice, the first file bearing the number is automatically closed.

File Separator A special pattern of bits or frequency which separates one file from another on magnetic media such as tape or disk.

File Specification Or, filespec. The complete specification (in CP/M) of a file including file name, drive identifier, and extension. See Filespec for more detailed information.

File Transfer The PIP command is one of the most commonly used commands to transfer files in CP/M. It provides a convenient utility to the user for copying or transferring files from one disk to another. PIP can process files as they are tranferred.

File Types—Apple III Business BASIC Apple III Business BASIC recognizes a number of different file types in its file handling transactions. These file types are listed below:

TYPE	DESCRIPTION
BAD	Denotes damaged portion of diskette.
BASIC	Denotes a BASIC program.
BINARY	Denotes an Assembly language file.
CAT	Describes a subdirectory or root directory.

DATA	File is a DATA file accessible from BASIC.
FONT	File contains a character set.
FOTO	File contains data which produces a graphics display.
PASCOD	Denotes a Pascal code file.
PASDTA	Denotes a Pascal data file.
PASTXT	Denotes a Pascal text file.
RESERV	Type designator reserved for future use.
SYSTEM	Denotes a system program file.
TEXT	Denotes a text file accessible from BASIC.
UNKNWN	Denotes a file which has been named but not written to.

File Types—CP/M CP/M file types are designated by file extensions which reflect the nature of the files. The most common CP/M file types are: .COM, which designates command or transient program file; .BAK, which designates a backup of another file with the same file name; .WRK, which designates a working file; .BAS, which designates a BASIC listing; and .INT, which designates a BASIC file which has been compiled.

Filemaster* A database management program for the Apple II and Apple II+. It allows up to nine different files on the same disk, contains a simple word processor, and is capable of simple mathematics. Filemaster resides in RAM rather than on disk, making the operation of the program much faster than a program which accesses the disk drive for each transaction. Once entry to a file has been completed, the file is saved to disk. Forms may be completed with this program by setting up data entry and output screens that match the form. 48K; Applesoft. Businessmaster.

Files—COMP CP/M Command. See Files—Comparing.

Files—Comparing COMP, the CP/M command, compares two files and displays any bytes which may be different with their locations (hexadecimal [q.v.]) in the file. After a 10-byte mismatch between the files, COMP aborts the comparison on the theory that two very different files are being compared. The overall purpose of COMP is to determine if a copy of a file is identical to the original. This could answer such questions as:

Did a copy or transmission work correctly?
Has the file been updated or changed?
Is a sector bad?

A useful technique for communicating data from one computer to another is to send the file to the other computer; have the other computer send it back; then compare the file you received to the original you sent. If this comparison is acceptable, you can be confident that the file the other computer has is identical to the original. Also, if a program or batch file (.BAT) terminates due to an error condition, you may not be sure which files did or did not get updated. You can investigate this by using COMP on the files you were processing as compared to your backups. (You always have fresh backups of a file before major processing, right? Right!).

COMP compares files on the same or different diskettes. If you omit parts of the second file name, they are assumed to be the same as in the first file name (drive, name, extension). If too much is omitted (like the first file name), COMP will ask you for the missing information. COMP also waits for you to change diskettes (if necessary) and press a key before it starts. If no mismatches are found, COMP says "files compare OK." It always gives the Y/N option to compare more files before it quits.

Notice that the very first thing COMP checks is the size of the two files. If they are different, COMP immediately concludes the files are drastically different and invites you to compare other files. And if you use the wildcard characters (global characters) * and ?, only two files will be matched. They will be the first file found to match the first file name and the first file found to match the second file name. See COMP for a list of the messages it produces.

Files—Determine Default or Current Diskette Drive. In CP/M, to determine which is the default diskette drive, use FILES from BASIC and see which diskette is indexed on the screen, or go to DOS (the operating system) and look at the prompt (A> or B>) for default drive.

DOS and BASIC keep an internal record of which diskette drive is currently considered the default diskette or default drive. When you start a CP/M or BASIC session, the default diskette drive is always A. To change the default diskette drive to B, type in B:; to go back to A as default, type in A:.

Files—Listing Files or Programs on Diskette CP/M Use of DIR. If you are in BASIC (prompt is OK), use FILES or FILES "B:*.*". If you are in DOS (prompt is A> or B>), for the default diskette drive, enter: DIR. For diskette drive B enter: DIR B:.

If you are unsure of the exact spelling of its name, this is useful to find a program on file. If you still cannot identify your program from DIR listings of all diskettes, you may have to load and list likely-looking candidates until you find it. This points out the usefulness of mnemonic program and file names that remind you of what the purpose of your file is, and a REMark at the start of each program to make it easy to identify the program when listed. Invisible files (q.v.) will not be listed. See DIR.

Files on Diskette—Use of DIR The CP/M listing command DIR allows you to see a list on the screen of all files on a diskette, or selected files on a disk. Each displayed file will show file name, size in bytes, and date and time last modified. A count of the number of displayed files is also provided. DIR is an internal command, part of COMMAND.COM. DIR by itself lists all files on the current default drive. To list all files on another drive, specify the drive number:

```
DIR B:
```

To list selected files, give a partial filespec. For example, to list all COM files on drive B: enter:

```
DIR B:.COM
    or
DIR B:*.COM
```

To list all files named FILE1 on drive B regardless of extension:

```
DIR B:FILE1
    or
DIR B:FILE1.*
```

To list all files on drive C with names beginning with FILE and extensions beginning with B:

```
DIR C:FILE*.B*
```

To see files with no extension, use only the period (.):

```
DIR B:*.
```

DIR has two options: /P and /W. /P after the command causes the display to pause when the screen is full so it doesn't zip out of sight before you can read it. It's a little less rushed than trying to get to CTRL-NumLock before the files scroll off the screen.

/W produces a wide display showing five file names and extensions across each line on the screen. Information on size, date and time of update are omitted. If you are simply trying to see if a file is on a diskette, this puts more information on one screen. An improvement is SDIR, which gives a directory listing arranged in alphabetical order.

Files on the Apple* Provides a learning module on the important aspects of files. The course presumes a knowledge of programming and the Apple. It covers random, sequential, and binary files. 32K. Minnesota Educational Computing Consortium.

Files per Diskette, Number of See Track Organization—Diskette.

Fileshare* Many independant users can access the same COBOL files with the help of this utility. The information can be used or updated while different operations are executing. Single-user configurations can be changed to accomodate multiple use of files. Data locking can also be set to the users specifications. Fileshare comes with a complete User's Manual and an explanation of applications. Micro Focus.

Filespec A complete CP/M file name, including the drive, file name, and extension. File specification on filespec is used to show where the file specification goes in a typical command format. A DOS filespec has three parts:

```
<filespec> = <drivespec>:
<file name>.<extension>
```

A sample command appears as follows:

```
Example:A:FILE2.TXT
```

<drivespec> is always optional and is used to indicate which drive contains the diskette with the file.

<extension> may be omitted in some situations where the context provides a clear default value, such as .BAS for BASIC programs and either .COM, .EXE, or .BAT for names entered into the DOS prompt as command names.

Filing Systems for Diskettes* Library cases for diskettes, flip files, etc. Cases hold 1 to 100 diskettes and filing enclosures for tapes and magazines. C.R.C. Wholesale.

FILLCOLOR The FILLCOLOR command is used in Apple III Business BASIC to designate the background color used on a graphics screen. This command is accessed from the BGRAF.INV module; it can also be used to erase a screen by using a background color which matches the pen color used to draw lines.

Filling Out Job Applications* Explains different job categories on job application forms and displays an application on the screen. Quinsept, Inc.

FILLPORT This command is available in the BGRAF.INV module. It is used to fill the background color in the viewport of an Apple III and can be used in the same fashion as FILLCOLOR.

Finance I* Computes the payments, interest, and payment schedule for mortgage payments. It also allows you to calculate the future value of the property. 48K; cassette. MPA Enterprises.

Financial* A package of programs for performing many financial routines, such as loan payment and interest schedules, future value of an investment, internal rate of return, cash flow analysis, and more. Computer House Div./FLC, Inc.

Financial Analysis Package (FAP)* Financial executives will find this to be a very handy aid device when creating budgets for company divisions, making decisions such as whether to buy or lease property, and more. 48K; printer. Execuware.

Financial Analyzer* Study your monthly expenditures and devise a realistic budget to fit your needs. Disk. Creative Discount Software.

Financial Facts* A collection of programs for basic financial analysis. The programs deal with interest, repayment of principal on loans, loan payments, depreciation, future value of an investment, and a number of other related matters. This collection of programs requires Applesoft in ROM or on a RAM expansion card. It also requires at least one DOS 3.3 disk drive. A printer is not required but is useful if printouts of the various tables are desired.

The programs in the collection are not intended for the financial analyst, but for the user who knows enough about money and interest to be concerned about the impact of specific investments. Howard W. Sams & Co., Inc.

Financial Management System II* A checkbook program—and much more—designed to fill your small business or home accounting needs. The system automatically performs tax coding, has functions for balancing and reconciling, editing and sorting, and provides easy access to data through the search function. 48K. Computerized Management Systems.

Financial Management System III* Requires no programming skills to run this menu-driven system that lets you enter up to one month's financial information. The features include a budget program, a bank reconciliation program, an audit program, and a search program that can locate and organize different types of data. 48K; DOS 3.2 or 3.3. Computerized Management Systems.

Financial Management System III With Checkwriter III* A complete system to organize your financial structure. Many files and records can be maintained at the same time. Data can be edited or updated at any time to keep the data current. Calculations can be set to perform balancing automatically. The program is easy to use and is well documented. Computerized Management Systems.

Financial Needs Analysis* An excellent sales aid for the life insurance professional. Helps you analyze your client's financial prospects in the event of disability or death of the working spouse. Retirement benefits (including Social Security) for both spouses can be projected and compared to a stated goal. Apple II+; 64K Insurance Micro Software, Inc.

Financial Package* There are four programs in this package. The first is the Amortization Table for calculating schedules for amortized payments on loans and leases. The second program calculates depreciation rates according to a variety of schedules, and prints a report or outputs results to an onscreen display. The third program is for internal rate of return and financial managers' rate of return, and will supply these figures based on up to thirty-two input cash flows. It also generates output in your choice of a printed report or an onscreen format. The fourth and final program generates analysis of wrap-around mortgages, deed contracts, loans, or inclusive deeds of trust. Handles a variety of interest rates, payment schedules, and other flexible terms. Real Estate Microcomputer Systems, Inc.

Financial Partner* An accounting system for the household or small business with a yearly income of $1 million or less. Learn basic accounting procedures as you use the package, which comes with a readable User's Manual. It will handle your payables, receivables, and general ledger, as well as generate financial statements. 48K; 140K on-line disk storage; 40-or 80-column display device; and optional 80-column printer. The Denver Software Company.

Financial Utilities* A menu-driven program that includes nine commonly used business routines to analyze any user-defined combination of input variables. Results may be printed. Farmplan Computer Systems, Inc.

Financing A Car* Research your credit possibilities through this program. By inputting your personal data and terms of a loan, your chances for credit can be calculated by the utility portion of this package. It is handy for car loan applications, but can be applied to other types of loans and credit seeking situations. MCE, Inc.

Find Character or String in a String See MID$—BASIC Statement.

Find the Key* An easy-to-handle program that helps students learn piano notes by matching keys with their letter names. 16K. Edutech Corp.

Finding Programs or Files If you are in CP/M (prompt A> or B>), for the default diskette drive enter:

```
DIR
```

For diskette drive B enter:

```
DIR B:
```

If you are in BASIC (prompt is OK), ENTER:

```
FILES
or
FILES "B:*.*"
```

This helps to find a program on file if you are unsure of the exact spelling of its name. If you still cannot identify your program from DIR listings of all diskettes, you may have to load and list likely-looking candidates until you find it. This points out the usefulness of mnemonic program and file names, and of a REM at the start of each program to make it easy to identify when listed. Invisible files will not be listed. See DIR.

Firmware A program stored in a ROM. Originally, firmware was used only for microprograms inside the CPU. In microprocessors, many kinds of programs reside in ROM, and firmware designates any ROM-implemented program.

First Day On The Job* A program that covers important points for making a good impression on your first day on the job. Grooming, arriving on time, and communicating effectively when instructions are not understood are covered. A job simulation is offered so that decisions regarding possible first day experiences can be worked out on the computer before starting the job. Mesa Research.

First Edition* A conferencing package that also features general database and electronic mail capabilities. You will be able to enter messages and pick them up using the First Edition in conjunction with regular phone lines that use a terminal and standard 30 characters per second or 10 characters per second modem. New messages connect to others already in the database so that users can organize a conference tree of messages. You can also arrange for your messages to be available to anyone using the system, or for complete privacy. This is a low cost, easy-to-use system. It comes with a manual that, in addition to offering technical information, serves as a useful introduction to microcomputers for non-technical people. Communitree Group.

Fishing For Answers, Addition (Level 1)* For kindergarten through second grade, this program presents addition problems with graphics and verse on five levels. 32K. NTS Software.

Five Minute Financial Check-Up* Design a personalized budget to meet your needs after a full analysis of your income and spending. Creative Discount Software.

Fixed Head Disk A disk system with a head over each track. This eliminates head positioning delay time by providing very high-speed access, but at high cost.

Fixed Media for Recording Information. The physical devices used for recording information, such as programs and data files, are called media. The main medium for the Apple is diskette, but cassette, hard disk, RAM, ROM, and other devices are also used. Media are often classified as:

a) removable media: such as diskettes, cassettes, and some hard disks, or

b) fixed: such as most hard disks. Fixed media are not removable from the device that drives them, so there is no ability to store additional data or backup copies off-line (outside the computing system) for insertion when needed. See Memory.

Fixed-Point Integer representation with the decimal point assumed to be in a fixed position. Contrast with floating-point.

FIXSPEC The FIXSPEC statement is used in Apple III Business BASIC to specify the format of output containing decimal numbers. It is used with the PRINT USING command to specify decimal placement. An example follows:

```
PRINT USING"###.##";4.665*12.223
```

This use of PRINT USING and its FIXSPEC feature would ensure a two decimal point result in output.

Flag A status indicator for a special condition. A flag is normally stored in a flip-flop or in a register. Typically, a microprocessor provides at least the following status flags: carry, zero, sign, overflow, and half-carry or auxiliary carry. The Apple provides all of these plus interrupt and direction (decrement/increment).

Flag—BASIC Used to indicate a particular condition in a BASIC program; most often used in a sorting routine to indicate that an exchange of values has occurred. In the following example of a bubble-sort, the variable SW is called the flag (SW is a mnemonic (q.v.) for SWap.)

```
100 SW -0
110 FOR I = 1 TO N
120 IF A(I) =< A(I+1) THEN 140
130 T = A(I) : A(I + 1) : AI + 1) + T : SW =1
140 NEXT I
150 IF SW = 1 THEN SW = 0 : GOTO 110
```

Flag—Status Register Bits Each bit in the status register (q.v.) of the central processing unit (the 6502 chip) indicates the status or result of a different operation, and is known by the term flag. Each of these bits will be either zero or one, depending upon the last operation affecting that bit.

FLASH BASIC Command. Used to alternate the display between inverse (black characters on a white background) and normal (white characters on a black background). It is often used to call attention to a particular part of the screen, but it can be very annoying if overdone. The flashing display is cancelled by using NORMAL and printing over the screen position where the flashing display was.

Flex-FORTH FORTH is a language that is growing in popularity. This package is complete with compiler/interpreter, Assembler, editor, and operating system. FORTH is faster and in some ways easier than BASIC. The Assembler allows macro commands such as IF...ELSE, BEGIN...UNTIL, BEGIN...AGAIN, IF...ENDIF, and others. Some of the features include defining words for constants and variables,adding new strings and arrays easily during the programming process,and full editing capabilities. 48K; disk or tape. Geotec.

Flexiterm* A flexible and intelligent terminal package. In addition to being able to send and receive data, it features full text editing; ability to support five interface cards; supports eighty columns with a Videx board; ability to send and receive data at 110, 300, or 1200 baud rates; and a print option. Time is saved by having text editing and communication capacity in the same package. It can be configured for these cards: CCS Async Serial Interface Card, Apple Serial Interface Card, SSM AIO Interface Card, Hayes Micromodem II, Electronic Systems Card, and Apple Communications Card. DOS 3.3; requires one of the cards listed above. Computer Stations, Inc.

Flight Companion 2* The pilot's helper. Helps with pre-flight planning by cutting down the time you spend on planning your flight and increasing your accuracy. In addition to flight planning, it also places emphasis on weight and balances. Here are the ten sections it is divided into: 1) flight planning, 2) add/subtract hours and minutes, 3) latitude/longitude, 4) wind problems, 5) weight and balance, 6) density attitude, 7) true airspeed and mach number, 8) fuel calculation, 9) time, speed, distance, and 10) conversions (thirty possible combinations). You can use the weight and balance program for a single-seat, one-engine aircraft, all the way up to a business jet for twelve people. With the flight planning program, you can change a regular route with a small amount of input. Mesa Research.

Flight Planner, The* This is the definitive flying tool. It will enable you to figure distance, wind effects, payload capacity, reserve fuel range, endurance, direct operating costs, charter trip quotes, optimum cruise altitudes and the maximum reserve range. There also are many other displays: analysis of fuel burns and flight times by altitude, each one subdivided into descent, approach, climb, and cruise segments. This program works by using flight manual performance data for climb, cruise, and descent segments. It has automatic adjustments for bonus altitude that is gained by airport elevation. The computer flies this analysis at all potential altitudes and chooses the most economical route with the least fuel altitudes. When you use this program, you will operate at peak performance; it will work for a single aircraft or an entire fleet, for any airport in the world. Flight Opps.

Flight Simulation Software See Air Navigation Trainer (ANT); Aircraft Instrument IFR Simulator; AirSim-Flight Simulator; Flight Companion 2; Flight Planner, The; Rocket Pilot; Straight Line.

Flip-Flop Abbreviated FF. A circuit used to store one bit of information. An FF is bistable with two stable states (0 and 1). Registers are generally assembled out of flip-flops.

Flipper* A controllable switch that lets you change voltage signals using simple software commands. The device connects with the "game bus" port to use the annunciator output zero (ANO), and allows unobstructed use of the remaining functions for game I/O by providing a parallel I/O connector. The board can also be used to switch other signals or alternate two different signals into a digital-to-analog converter. Aurora Systems, Inc.

Flippy Another name for a mini-floppy. Also used to describe a single-sided diskette which has been turned (flipped) over to record data on the back side.

Floating Gate A technique used for UV-erasable EPROMs. A silicon gate is isolated inside the silicon dioxide.

Floating-Point Dictionary* This programming aid for Applesoft BASIC can help you learn the language, as well as becoming a part of your permanent reference library. It includes a dictionary of BASIC commands with example programs. You merely ask for a command; the program then shows you the command forms and runs a small demonstration program using the command. Charles Mann & Associates.

Floating Point Package A set of software routines or hardware features necessary to perform floating point arithmetic: add, subtract, multiply, normalize. To assure proper precision, the design of an FPP requires careful analysis of error propagation phenomena.

Floating Point Representation Representation of numbers in a fixed length format, such as 24 or 32 bits. The number N is normalized and encoded as a mantissa field M and an exponent field. The name reflects the fact that the representation remains fixed as the decimal point floats, i.e., the changes in magnitude are reflected by adjustment of the exponent field with renormalization of the mantissa field. The precision of the representation is limited by the number of bits allocated to the mantissa field. Contrast with fixed point.

Floppy, Mini A smaller floppy that is 5 ¼ inches square compared to 8 inches for the original floppy. This is the standard size for the Apple.

Floppy Boxes* These boxes are designed to hold floppies for transportation or mailing. The product comes in two sizes—one which holds up to three disks and the larger model which will hold floppies and folded 8 ½ by 11 booklets. ALF Products, Inc.

Floppy Disk A flexible mylar disk (diskette) for mass storage of information. The diskette is sealed in a square plastic jacket, lined with a soft material which cleans the diskette as it rotates. A cut-out slot provides access for the moving head which must actually come in contact with the diskette surface in order to read or write. Other holes in the jacket provide access to sector index holes in the diskette. Diskettes are hard-sectored if the sector start points are marked by holes in the diskette. Soft-sectored diskettes have only one (or a few) holes to mark the start of the track. The sector start marks are placed on the soft-sectored diskette, under software control, during a process known as formatting the diskette. The Apple uses soft sectored 5 ¼ inch diskettes in its standard drives. 8 inch diskettes and 3 inch microfloppies are also available for the Apple. Each of these different formats requires its own disk drive and controller card.

Diskettes are also classified as single- or double-sided, single-, dual-, or quad-density. See Diskette Format.

Flowchart A symbolic representation of a process. Boxes represent commands or computations; diamonds represent tests and decisions (branches). A flowchart is a useful step between process specification and program writing. It aids in understanding and debugging the program by segmenting it into logical, sequential steps.

Flush Output By using the CTRL-9 key combination on the Apple III computer the user can stop (flush) output to the screen although the program currently running continues. Pressing the Control key and the number 9 on the numeric keypad causes screen output to resume.

Flush Type-Ahead Buffer The Apple III user can erase (flush) the contents of the computer's type-ahead buffer by pressing the Control key and the number 6 key on the numeric keypad. Both keys must be pressed together. The CTRL-6 combination can be used to start data entry to the buffer over again when an error has been made.

Flyback The time delay while the spot on a CRT comes back to the beginning of a frame.

FMS File Management System.

FOCAL-65* This is a high-level language from Digital Equipment (DEC) that has been adapted to the Apple. String handling capabilities have been added to this version. 48K; APEX DOS. The 6502 Program Exchange.

Follow the Dots Coloring Book* Connect the dots and paint the picture with an array of 300 colors. The dot-pictures may be pre-defined or created by the user. 48K. Avant-Garde Creations.

Following Written Directions* The importance of following directions, either by words, signs or pictures, is explored. A game is included. Mesa Research.

Font Writer* A software package that gives users a choice of type fonts for use with the Apple Writer Text Processing System. This allows intermixing of print fonts within the text file, alteration of spacing between the lines, a choice of dot density, printing of up to 32-point high characters, and inclusion of hi-res graphic displays. Micro Peripherals, Inc.

Food Facts* A five-program study for students in seventh grade and up, that increases their knowledge of nutrition and energy relationships. Cereals, fast foods, chemicals, and vitamins are covered by these lessons. 32K. Minnesota Educational Computing Consortium.

FOOTNOTE* A WordStar* enhancement. Adds much needed footnoting capabilities to WordStar*. Notes can be interleaved with text or extracted. PRO/TEM SOFTWARE.

FOOTNOTE* A program that will number and format footnotes on each page or into a footnote file. Includes a program to check underlining and the elimination of boldface commands. Digital Marketing.

FOR and NEXT BASIC Statements. The FOR statement used in conjunction with the NEXT statement performs a series of instructions in a loop a given number of times. The format is:

```
FOR <variable> = <x> to <y> [STEP <z>]
.
.
.
NEXT <variable>[,<variable>...]
```

<variable> is an integer or single precision variable to be used as a counter.

<x> is a numeric expression which is the initial value of the counter.

<y> is a numeric expression which is the final value of the counter.

<z> is a numeric expression to be used as an increment.

Within a single FOR ... NEXT loop, all lines following the FOR statement are executed until the NEXT statement is encountered. Then the counter <x> is incremented by the amount specified by the STEP value <z>. If you don't specify a value for <z>, the increment is set to 1 (one). A check is then done to see if the value of the counter is now greater than the final value <y>. If it is not greater, BASIC goes back to the statement after the FOR statement, and the process is repeated. If it is greater, the first statement following the NEXT statement is executed.

If the value of <z> is negative, the check is reversed. The counter is decremented each time the loop is executed and execution continues until the counter <x> is less than the final value <y>.

The statements within the FOR...NEXT loop are not executed if <x> is already greater than <y> when the STEP value is positive, or if <x> is less than the <y> when the STEP value is negative. If <z> is zero, an infinite loop will occur unless you provide some way to set the counter greater than the final value.

Nested loops is the name given to a situation where one or more FOR...NEXT loops are placed inside a FOR..NEXT loop. Whenever FOR...NEXT loops are nested, each loop must have a unique variable name as its counter. The NEXT statement for the inner loop must appear in a statement before the NEXT statement for the outside loop. However, if nested loops have the same end point, a single NEXT statement may be used for all of them.

Using the format:

```
NEXT <variable1>,<variable2>,<variable3>
```

is the same as

```
NEXT <variable1>
NEXT <variable2>
NEXT <variable3>
```

The variable or variables in the NEXT statement may be left out. In this case, the NEXT statement returns to the most recent FOR statement. When using FOR...NEXT loops, you should include the variable or variables on all the NEXT statements. It is a good rule of thumb to use variable names on all NEXT statements in order to avoid confusion.

When a NEXT statement is encountered before its corresponding FOR statement, a "NEXT without FOR" error is displayed.

Some examples are:

```
10 M=2:K=10
20 FOR I=M TO K STEP 2
30 PRINT I;
40 NEXT
RUN
 2
 4
 6
 8
10
```

Forecaster II, The* A program for computing linear regression trend analysis and displaying results on a hi-resolution graphics screen. 16K. Systems Design Lab.

Foreground Program In a multi-programming environment, a higher priority program. Also, a program in charge of interfacing with a user or process. See Background Program.

Foreign Language Software See Adicion en Columnas; Adivina El Numero; Alicia—A Bilingual Reader; Anadiendo; Contando; Definite Article, German Language; Foreign Language Vocabulary Drill; Foreign/English; French; French Hangman, The; French Vocabulary Drill; French 1; German; German & Russian Practice; German Vocabulary Drill (Sliwa); German Vocabulary Drill (Powersoft); Hebrew II (Aurora); Hebrew II (Anthro-Digital); Hebrew Reading; Hebrew II Plus; Hebrew Writer; Inventario 1 Whole Numbers; Inventario 2 Fractions; Inventario 3 Decimales; Juego De Suerte; Juegos Ortograficos; Language Skills (German, French, Spanish); Linguist; Malum II...Imperial Roman Programmable Computer; Micro-Deutsch; Numeros, Todos en Sus Lugares!; Pescando Respuestas, Adicion (two levels); Pescando Respuestas, Sustraccion (two levels); Russian Disk, The; Secuencias; Span; Spanish; Spanish for the Traveler; Spanish Hangman, The; Spanish Vocabulary Drill; and Spiel.

Foreign Language Vocabulary Drill* Allows students to study and test their vocabulary in a foreign language. Choose German, Spanish, or French. Compu-Tations, Inc.

Foreign/English* Contains more than 900 American vocabulary words that come from foreign languages. Correct definition, pronunciation, originating language, and a literal translation is included in each multiple choice question. Sliwa Enterprise.

Form Feed Advance to top of a page printer. How to Enter. The BASIC statement to Form Feed is:

```
PRINT CHR$(12)
```

Or use the "top of form" or "form feed" manual control button (FF) on the printer. You may then need to adjust the paper in the printer so it actually is at the top of a page as defined by the perforations.

In a program, you may want to provide instructions to the operator and a pause (q.v.) to allow the adjustment of the paper.

FORMAT DOS command to format or initialize a diskette. FORMAT is an external command, existing as FORMAT.COM on the DOS diskette and loaded by DOS as needed. It can create either a completely empty data diskette, or by using the /S option, a diskette with a skeleton DOS. You may also format a single-sided diskette on a dual-sided drive by using the /1 option.

FORMAT destroys any data on the diskette. Every sector on the diskette (eight sectors per track) is checked for errors and formatted. If the sector is bad, it is flagged in the file allocation table as defective so it will not be allocated to a file. The command format is:

```
FORMAT <drive>
```

FORMAT produces a display upon completion which shows the status of the diskette. The following messages may also appear:

```
Attempted write-protect violation
```

The diskette you are trying to format is write-protected. Insert a new diskette to format or remove the write-protect tab and press any character key to restart the formatting procedure.

```
Disk unsuitable for system disk
```

The diskette can only be used for data since the track where the DOS files are to reside is defective.

```
Format failure
```

The diskette is unusable.

```
Insert DOS disk in xxxxx and strike any
key when ready
```

The drive xxxxx doesn't have the DOS diskette, so DOS can't reboot, or FORMAT and SYS can't load the DOS files. Also DOS and SYS produced.

```
Invalid parameter
```

A valid drive specifier followed by a colon (:) must be entered as a parameter for these commands. Also CHKDSK, DISKCOMP, DISKCOPY, or SYS produced.

```
Track 0 bad-disk unusable
```

The boot record, file allocation table and directory must reside on track 0. Since it is bad, the diskette is unusable.

Format ROM* A formatting program that will customize your letter or manuscript to look just the way you want it to. Offers a variety of formatting instructions, five modes of PRINT...USING, and will support all printers. 48K. Soft Control Systems.

Format II* A word processor which may be used on the Apple II+ and the Apple IIe computers. The Apple+ computer requires a SHIFT key modification which is suppled by the manufacturer when you send in your registration card for the software. This program also requires 16K of RAM expansion on the Apple II+, two DOS 3.3 disk drives, and an 80-column card. If an Apple II computer is used for this program, the Applesoft ROMs must be installed, which makes it an Apple II+ for all intents and purposes. The program will operate with the Apple 80-column card for the Apple IIe, the Extended 80-column card for the Apple IIe, or the Videoterm*, Smarterm II*, Omnivision*, and the Sup 'R' Term*. A monitor and a suitable printer are also required.

Format II is a powerful but simple to use word processor. The editor is similar to editors of other word processors. It relies on the directional arrows on the Apple IIe to move the cursor wherever it is required; it uses CTRL-K to move the cursor up one line and CTRL-J to move it down one line on the Apple II+. The SHIFT key (with the manufacterer's modification) produces a single capitalized character on the Apple II+. The CTRL-SHIFT combination produces Caps Lock on this computer. The Apple IIe version uses the Caps Lock key and the SHIFT key to produce capital letters. Printer codes are available at any time in the editor by using the CTRL key and a number key between 0 and 9 on the Apple II+.

The program offers all of the normal formatting features that are common in word processors today, including right or left justification of text, text-centering, filling spaces to achieve justification of text on both sides, search and replace, and quicksan features. The documentation which is provided with Format II is quite thorough. Even a novice can master this program. The SHIFT key modification is absolutely required on the Apple II+. Without it, the program will not run properly. Two disk drives; 80-column card; CRT; printer; 16K expansion for the Apple II+. Kensington Microware, Ltd.

Formatter A circuit or program which writes the file marks, track marks, address marks, pre-ambles, postambles, and check characters for floppy disks, disks, or tape drives. See FORMAT, and Initialize a Diskette.

Form-It-Out* Six tutorial routines in Integer and Applesoft BASIC. Each routine is explained and its programming application is described with a sample program listing which uses the routine. Some of the areas covered are cursor location and positioning, justification, text windowing, and error subroutines. Softagon.

Formula Reader* Formulas, labels, and numbers from the top of the VisiCalc* screen, along with their coordinates, can be displayed or printed without truncation of long formulas. Data Security Concepts.

Formulas of Compounds Drill* Compounds are randomly synthesized and students must create the correct chemical formulas. Microphys Programs.

Formulator A development system for the F-8 microprocessor.

Formulex* Lets you set up a data system for all your personal and business record keeping. Features simple commands, easy-to-use forms, user defined subjects, automatic filling of redundant fields, and selective searches. Modification, deleting, and listing can be done with built-in commands. 48K. Apple Computer, Inc.

FORTH A programming language and operating system. FORTH is characterized by threaded code and postfix, or reverse Polish notation. Forth is an extendable language; you can create new commands defined in terms of the existing commands or in Machine language. Your new commands then become part of the FORTH language in exactly the same way as the standard commands. This feature allows you to build up precisely the commands you would request if you were designing a language specifically to suit a particular application or type of problem. FORTH is also highly transportable from one microcomputer to another, more so than BASIC and most other languages. FORTH tends to run fast—closer to Machine Code than to higher level languages like BASIC. FORTH may be somewhat harder to master than BASIC, but it offers many advantages. FORTH for the Apple is available from the FORTH interest group in your city. A version called SUPERFORTH* is available from Hayden Book Company. TRANSFORTH II*, a complied version, is available from Insoft. FLEX-FORTH*, another integer FORTH, is available from Geotech.

FORTH Development System* The system includes a manual, hi-res compatibility, a screen-oriented editor, sample screens, and a built-in 6502 Assembler which has a capacity for macros. 48K. Information Unlimited Software, Inc.

FORTH II* Included in this package are a hundred page manual, three example games, and a line-oriented FORTH editor. 32K. Softape.

FORTH-79 Ver. 2* FORTH language is faster than BASIC with more compact code, too. This package includes everything you need for easily writing programs that compile fast and lend themselves to a wide variety of applications. An editor, Macro Assembler, string package, integer arithmetic, and complete manual come with this utility package. Micromotion.

FORTRAN FORmula TRANslator. One of the first high-level languages, FORTRAN is still widely used, especially by scientists and engineers. BASIC is largely based on FORTRAN, using statement numbers and a similar set of commands. The differences are slight, mostly dealing with I/O statements. FORTRAN includes the FORMAT statement for formatting printed output. It is rich in mathematical functions and supports an extended precision calculations mode for scientific problems.

FORTRAN is a compiled language and not interpeted like BASIC. A program is edited in a file, then submitted to a compiler for translation into executable object code. FORTRAN and BASIC are so similar that BASIC could be called an interpeted dialect of FORTRAN. Here is a sample FORTRAN program to sum the first 100 integers:

```
20 FOR I = 1 TO 100
30 J = J + I
40 NEXT I
50 END
```

FORTRAN for the Apple is available if you have 64K of RAM, CP/M, and two disk drives.

FORTRAN Transcendental Routines* A software package to combine the capabilities of the AM9511 chip on the FFP board with FORTRAN. Computer Stations, Inc.

Fourier Analyzer* See the results of frequency spectra analysis plotted or graphed with this useful program. Input data is easily displayed for short duration signals. Available on cassette or disk. Dynacomp.

Fourier Transform The mathematical analysis of a complex waveform into harmonic components.

FP System command. Typing FP when using Integer BASIC (> prompt) will return you to Applesoft. From the system monitor (* prompt), you must type 3DOG or press CTRL and the B key together, which will return you to whichever language was active before you entered the monitor.

FPGA Field Programmable Gate Array. A device containing an array of AND and OR gates which can be re-connected (programmed) in the field (i.e., without return to factory).

FPL* Create individual financial planning. Lets you structure, preview, and edit data before production of reports. Easy access and manipulation of data. Ashton-Tate.

FPLA Field Programmable Logic Array. A PLA which can be programmed by the user. FPLAs are used to implement the control section of bit-slice processors.

FPLS Field Programmable Logic Sequence.

FPP Floating-Point Package.

Frac-Dec-Percent* Provides practice in converting fractions, decimals, and percentages. 32K. Indian Head Software.

Fractions* Become more proficient at working with fractions. Presents seventy-one levels of addition, subtraction, multiplication, division, fractions, decimals, improper, mixing, and reducing. 32K; 48K. Educational Teaching Aids Div.

Fractions* Examples of math using fractions. Incentives are offered for correct answers. Right On Programs.

Fractions* A package of twenty-four programs that gives students the opportunity to practice the basic mathematical functions in such areas as fractions, decimals, mixed numbers, and measurements. Includes teacher's manual. 32K; 48K. Quality Educational Designs.

Fractions* Multiply fractions for conversion to equalities. Has twenty-two levels of difficulty. 48K. The Computer Connection.

Frame The necessary underlying structure for a record, file, or other data item. The frame creates an organization within which the data takes its place.

Frame-Up* A utility program which allows loading a slide or display within two and a half seconds by using the keyboard. Features hi-and lo-res. Beagle Brothers Micro Software.

FRE BASIC Function. FRE will return the number of bytes in memory that are not being used by BASIC. This number does not include the size of the reserved portion of the interpreter work area, which is normally 2.5K to 4K bytes. The format is:

```
<variable> = FRE(<x>)
<variable> = FRE(<x$ >)
```

(<x>) and (<x$ >) are dummy arguments.

Since strings in BASIC can have variable lengths, they are manipulated dynamically. Each time you do an assignment to a string, its length may change. For this reason, string space may become fragmented.

FRE with any string value will cause a housecleaning before returning the number of free bytes. This means that BASIC is collecting all of its useful data and freeing up unused areas of memory that were once used for strings. The data is compressed so you can continue until you actually run out of space.

BASIC will automatically do housecleaning when it is running out of usable work area. You could even use FRE("") occasionally to get shorter delays for each housecleaning routine.

CLEAR (n) sets the maximum number of bytes for the BASIC workspace. FRE returns the amount of free storage in the BASIC workspace. See CLEAR.

Freeze Screen Display To freeze the screen briefly while the operator using your program reads a message, just write a delay loop after you print the message:

```
1000 FOR Y = 1 TO 2000
1010 NEXT Y
```

To freeze the screen until the operator is done with it, put in a dummy input statement and instruct the operator to press ENTER to proceed. The input variable (A$) need not be used in your program:

```
1000 INPUT "Press ENTER to continue";A$
```

French* Learn French with over 800 entries including: French to English, English to French, and

French to French (synonyms). Each database is divided into files like Easy Nouns 2 or Hard Verbs 1. Programs are for beginning and intermediate levels. Sliwa Enterprise.

French Hangman, The* A hangman-style program that asks you for French translations of 500 words and 175 sentences; including proverbs. Uses the hi-res screen alphabet. 48K. George Earl.

French Vocabulary Drill* Drill and practice program for French/English, English/French translation. Written by a foreign language teacher. Good for elementary through college levels. Compu-Tations, Inc.

French 1* A program that is a French drill on the verb "aller." Tape'n Text—Williamsville Publications.

Freqout* Signal analyzing can be done with your Apple by using the Microproducts Data Acquisition and Distribution Board in conjunction with Freqout. Some of the operations include: Fourier conversion of data, frequency amplitude variations through time, and examination of other data. Sound analysis can be achieved for speech, musical instruments, bio-medical signals, and others. Microproducts.

Frequency The number of cycles per second. F=1/T where T is the period in seconds over which cycles are counted.

Front Panel A panel with lights and switches to display information and allow direct control or access to memory or registers. A front panel requires a specific interface and a monitor program. Many microcomputers have no front panel; all access is then performed from a keyboard and screen.

Front-End Processor A processor which acts as an interface with a user or a process. The front-end may perform pre-processing translations or file handling, while the main processor performs interpretation, execution, or other processing.

FS File Separator.

FSC Full SCale range.

FSK Frequency Shift Keying. A 0 is represented by one frequency, and a 1 is given a different frequency. These two tones are then transmitted over telephone or radio links and converted back to digital signals upon reception. See Modem.

Full Duplex A communication technique which allows data to be transmitted and received simultaneously.

Full-View 80* An 80-column card which is compatible with most programs on the market. The on/off control is accomplished with software. Bit 3 Computer Corp.

Function Grapher* Offers a choice between circular functions, absolute value functions, greatest integer functions, polynomial functions, or user-supplied functions. Each category contains subselections. 48K. Math Software.

Function Plotter* A statistical utility program that helps you plot functions. The user enters up to five functions, designates independent variable range and number of points, and the computer does the rest. Plotting is done in hi-res graphics. After function is plotted, user can redefine ranges for expanded or compressed plot. Additional features include shading, and sliding view window. 32K; DOS 3.3. Fullmer Associates.

Functions A menu is a screen display which lists a number of possible options and asks the user to select one. When a selection is made by keying in an identifying number or letter (or positioning the cursor beside the desired item, using a light pen, etc.), the selected function is performed. This may require either a branch or subroutine call to the code for the selection; alternately, the program to carry out the function may be loaded into memory and executed.

Many application packages use a system of multiple menus. A Master Menu lists the choice of major functions. Selecting an option on the Master Menu causes another menu to be displayed, indicating more detailed options for the selected function. This can be followed by even more detailed menus, and so on. Often, completion of a function will cause redisplay of the Master Menu. Such a system is known as menu-driven.

Functions* Includes dependent and independent variables, range and domain region, and equality. 48K. Avant-Garde Creations.

Fundamental The base or carrier signal on which a data signal will be superimposed. It is usually a pure sine wave with no distortion.

Fundamental Skills for General Chemistry* Among the areas covered by this comprehensive set of programs are: equation balancing, metric conversions, the elements, exponential notation, compounds, temperature conversions, and significant figures. Programs For Learning.

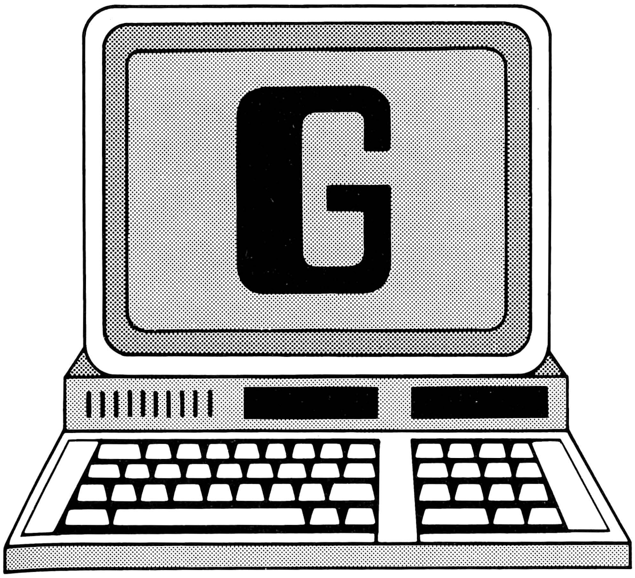
Furnace (Domestic) Design* Determines heat loss figures using R and air change values, and reports it in BTUS and TONS. Performs the thermodynamic modeling necessary for accurately determining the size of heating units required for a given structure. Utilities Engineering.

Furniture* The following products are designed to hold your Apple and its various peripherals in an attractive and efficient way. Some are in the form of desk workstations with room for your computer, monitor, disk drives, and printer, with room for you to spread out. Others are designed to stack the computer and peripherals in a compact form that will fit almost anywhere. Contact the vendor for more detailed information regarding these products.

PRODUCT	VENDOR
Apple Cart	Tele-Terminals, Inc.
Apple Crate, The	Softsel
Apple Desk, The	Electronic Systems Furniture
Apple Organizer Stands	Aids Computer Center
Apple Stacker	Equipment Enviroments, Inc.
Apple Stacker	Knickerbocker Case Company
Apple-Center	Doss Enameling Company
Apple-Center Model 12	Doss Enameling Company
Apple-Under-Glass	K & R Data Works, Inc.
Applewood—Computer Turntable	Applewood Computer Products
Applewood—Drive/Monitor Stand	Applewood Computer Products
Applewood—Printer Stand	Applewood Computer Products
Cool Stack	FMJ, Inc.
Computer System Desk	Computer Crossroads
Computer Table	Gusdorf Corp.
Furn-Wood Desk	Furn-Wood Manufacturing, Inc.
Microstand	Microstand
Station II	Trace Systems, Inc.
Under-Stand	K & R Data Works, Inc.

F/V Frequency to Voltage converter.

F-8 Fairchild's 8-bit microprocessor.



G Codes. ASCII = 71, HEX = 47. g—ASCII = 103, HEX = 67.

G Ground. Also, Generate signal. The output from an adder connected to a carry look-ahead circuit. It requires a propagate signal.

G Parameter A parameter used in CP/M with PIP. The use of this parameter by enclosing it in brackets after the file name in a PIP command line enables the user to copy a file from another user area, into the user area he is currently using.

Gain The output-to-input amplification ratio.

Galactic Attack* A high-resolution graphics game which runs on the Apple II, Apple II+, Apple IIe, and on the Apple III in the emulation mode. In a starship, you must maneuver through the solar system without being destroyed by enemy ships. Speed is adjustable and direction can be changed. As your ship traverses the solar system, the moon, earth, asteroids, and other planets scroll by. As enemy ships are encountered, they circle your ship and try to destroy it.

The scenario can be changed to introduce more enemy ships per encounter, to increase or decrease ability to withstand damage, and to increase or decrease torpedo speed. As action progresses, your ship may be stopped and repaired, shields may be dropped or regenerated, the ship may orbit various planets, enemy cities on planets may be stranded, armies can be beamed aboard your ship and beamed down to planets, and you can request a large area display of the solar system. This is an action-filled game with good graphics and sound. Sir-Tech Software, Inc.

Galaxy* A game of exploration and conflict where players compete for control of up to forty solar systems. Players send their galactic fleets out to explore and conquer the universe. The game comes with sound effects and may be played against the computer. A different star map is randomly produced for each game. Avalon Hill Game Co.

Game Controls Paddles or joysticks (q.v.) are connected through the I/O port on the motherboard (a 16-pin connector at the back).

Games The following products have been reviewed within this encyclopedia: Apple Cider Spider; Count, The; Cytron Masters; Death; Derby Downs; Early Games for Young Children; Ernie's Quiz; Escape from Arcturus;Galactic Attack; Galaxy; Hard Hat Mack; Hellfire Warrior; Hi-Res Mastertype; Instant Zoo; Invader Attack; Invader Round Up; Jewish I.Q. Baseball; Jewish I.Q. Baseball—Teachers' Version; Lazer Chaser; Magic Paintbrush (Graphics and Games); Mastertype; Math Facts Games—I; Mix and Match; Moptown; Morloc's Tower; Multiploy; Multiploy, by Paul Coletta; Music Games; Musical Match-Up; Mystery House; Night Before Christmas; Night Mission Pinball; Note Trespassing; Novelties; Olympic Decathlon; Piece of Cake; Pro Poker; Robot War; Rocky's Boots; Sargon II; Scientific & Games; STAR MAZE; Starblaster; SUCCESSION; Temple of Apshai; Voyager I; Warp Destroyer; Wizard and the Princess; Wizardry; Word Race; Zork I: The Great Underground Empire; and Zork II: The Wizard of Frobozz.

Games—Joysticks, Paddles, Accessories All the products below are related to game playing on the Apple. The listing includes joysticks, paddle controllers, and port extensions. Contact the vendor for more detailed information on the products.
* See table next page.

Gap The space between two records or two blocks of information on a magnetic medium. A gap is usually set to a predetermined value, such as all 1s. It allows blocks to be rewritten in a slightly expanded or reduced format, due to speed variations of the drive.

G.A.P. (Game Animation Package)* Design your own arcade games with this high quality graphics program. Each figure's detailed composition may contain several colors. 48K. Synergistic Software.

Garbage Collection A technique for collecting unavailable, unused space in a mass memory and making it available for reuse by any of several schemes. See also Housekeeping.

Product Name	Vendor
Adam & Eve I Game Paddles	Tech Designs, Inc.
EZ Port Game I/O Extender	Versa Computing, Inc.
EZ Port (Twin Switched ZIF Sockets)	Versa Computing, Inc.
Game Controllers	TG Products
Game Paddles	The Keyboard Company
Game Socket Extender	Happ Electronics, Inc.
Gameport Extender	Technologies, Inc.
Joyport	Sirius Software
Joystick	TG Products Etc.
Joystick II	The Keyboard Company
Paddle—Adapple	Southern California Research
Select-A-Port	Action-Research Northwest
Super Joystick	Peripherals Plus
Super Paddles	Peripherals Plus
TDI Joystick	Tech Designs, Inc.

Gate A single logic function. The NAND, NOR, AND, OR, XOR, and NOT functions are examples of gates.

Gauss A unit of flux density (1 Maxwell per square cm.), named for German mathematician Karl F. Gauss.

GCR Group Coded Recording.

GE General Electric. Also, Greater than or Equal to, which is represented by ⩾ or =>.

General Accounting System* A complete accounting system for the home or small office. A variety of record keeping accounts are available, including balance sheet, check register, sales report, profit and loss statement, cash receipts report, merchandise register, accounts payable/receivable ledgers, and payroll ledger. BPI Solutions, Inc.

General Ledger* Software published by Continental Software as part of its Computer Programmed Accountant series. It is a collection of programs that can integrate data from the Accounts Receivable, Accounts Payable, Payroll, and Property Management systems (all available from Continental).

The program comes with a complete chart of accounts that can be used or modified to user specifications. (The user may also design his own chart of accounts). The program generates the following reports: Profit and Loss Statement, Trial Balance, Balance Sheet, and Complete Journal Activity Report. Data in any account may be graphed and displayed on the screen. General Ledger can accomodate 120 accounts in the Chart of Accounts, approximately 1000 monthly transactions, provide current year vs. previous year figures, and maintain approximately a single year's history.

The documentation is quite complete and easy to use. It carefully defines the account definition procedure which is the heart of any general ledger system. In addition, it presents the conventions under which the system operates. Though the program can stand alone, it has the distinct advantage of accepting data from the other programs listed earlier. Much data-entry time and labor may be saved by taking advantage of this important feature. 48K; two disk drives; DOS 3.3. Continental Software.

General Ledger* Can chart a business's financial history or be used with other packages. The package contains the following features: master file, transaction file, transaction register, query account status, reports, depreciation/amortization schedules, and end-of-period processing. Peachtree Software, Inc.

General Ledger* An on-line package with real time B Tree index. General Ledger can run alone or with other packages. 48K; CP/M; and Z80. Facts Management Systems, Inc.

General Ledger* A menu-driven program which can handle over 500 definable accounts. It offers a variety of reports, handles a large number of transactions, performs budgeting and audit trails, and contains useful error checking. 48K; two disk drives; and 80-column printer. Small Business Computer Systems.

General Ledger* A program to handle the basic general ledger functions, such as setting up accounts and maintaining transaction records, plus features to enable the user to customize the system. You can specify your own output needs and format your own financial statements. This package also calculates your business's financial ratios and cash flow activity. Solidus International Corp.

General Ledger* A useful accounting aid. Keep track of up to thirty-six accounts that you name and number. Each account can hold 100 entries, and all information is easily accessible. You can edit entries, and the system contains a LOCK feature to secure your data against other users' access. 48K; printer is optional. Business Master.

General Ledger Accounting System* A system for small businesses requires no prior knowledge of computers. Includes The Balance Sheet, The Profit and Loss Statement, The General Ledger, The Accounts Receivable Ledger, The Accounts Payable Ledger, The Payroll Ledger, The Cash Disbursements Journal, The Invoice Register, The Cash Receipts Journal, The Merchandise Purchased Journal, The Cash Sales Journal, and The General Journal. BPI Solutions,Inc.

General Ledger/Osborne Conversion* A menu-driven program that is a conversion from the Osborne/McGraw-Hill version. Included are many transactions, a chart of accounts, departmentalizing, and a variety of reports. 48K; two disk drives; 110-column printer. Small Business Computer Systems.

General Ledger Software* There are a number of programs available that can help you keep accurate and up-to-date records. Accounting and general ledger principles have been around for a long time without much variation. Such is the case with most programs dealing with these principles. All of the following programs contain the basic features of record keeping, balance sheets, automatic updating, trial balance, accounts payable/receivable, and a variety of printed reports for analysis. Some of them may contain special features while most have similar formats.

General Ledger System* This user-structured, double-entry bookkeeping system allows up to 400 transactions per month and 250 account codes. It produces a general ledger by account code, a profit and loss statement, trial balance, and a balance sheet. It is designed to work with the manufacturer's Enterprize Analysis System. Computerized Farm Information Systems, Inc.

General Mathematics* Fifteen programs for those who want to improve and speed-up their math skills. The programs are: Rational Fractions; Normally Distributed Random Numbers; Nth Root of a Number; Circle Finder; Histogram; Dimension Scaler (for scaling down only); Number Rounder; Max/Min Locator; Vector Scalar Products; Vector Cross-Products; Combinations; Permutations (using the factorial approach); Rectangular-to-Polar Coordinates; New Coordinates; and Log to Any Base. An index and documentation are provided. Hayden Book Company.

General Natal Package* Will compute a natal chart for any date and any place in the world. The retrograde planets are indicated and the accuracy is AA1. Angles Ascendant and Midheaven are given. This is a complete natal program for smaller computers. Matrix Software.

General Purpose I/O Board* The features offered on this general purpose board are two 8-bit programmable input/output ports, fifty pages of instructions, a large area for user buffers, one timer/square wave generator, and more. Micro Austin.

Program	Vendor
Accounting Plus II	Systems Plus
Accts. Payable/receivable	United Software of America
Double Check	Computer Tax Service
General Ledger	Continental Software
General Ledger Module	Sentient Software
General Ledger Package	Small Business Computer Systems
General Ledger With Payables	Broderbund Software
Home Accountant, The	Continental Software
Ledgerplus	Microsource
Micro-General Ledger	Serendipity Systems, Inc.
Microaccountant	Spectrum Software
Microledger	Compumax
Personal Finance Library	MCE, Inc.
Personal Money Manager	Educational Computing Systems
Professional Timekeeping System	Computer Consulting Services
Systems II EX—General Ledger	Westware Software, Inc.
You Can Bank On It	MCE, Inc.

Generate New System Option The system configuration program on the Apple III SOS utilities disk offers the user the option of generating a new system configuration. This particular step is the final one in any reconfiguration process. Once all of the desired drivers have been loaded and any required systems parameters changes have been completed, the "generate new system" option is selected. This option saves the new system configuration to a system boot disk. Any time this particular disk is booted, the system will be configured to reflect the drivers and system parameters which were currently selected.

Geoart* Learn the fundamentals of geometry with these illustrated programs. Uses BASIC to teach reflection, rotation, and much more! Ventura Educational Systems.

Geoboard Geometry and Measurement* Extends use of geoboards through graphics display of a 25-pin geoboard. Reinforces ruler reading, measuring line segments, construction of parallel and perpendicular lines, and areas and perimeters of rectangles, triangles, and other polygons. 48K. Desktop Solutions.

Geometrical Optics* A tutorial for students that explains the concepts of refraction, reversibility, reflection, and convex lenses. Includes a laser beam game. Edutech,Inc.

Geometry & Measurement Drill & Practice* Two volumes, elementary and advanced, aid seventh graders and older in perfecting this branch of mathematics. Graphics and text will increase understanding before the student is asked to calculate equations. 32K. Apple Computer, Inc.

German* Teaches German vocabulary. More than 800 entries with German to English, English to German, synonyms, and German phrases to English. Each database is divided into files such as Easy Nouns 2 or Hard Verbs 1. Sliwa Enterprises.

German & Russian Practice* One side has German sentences and words in a hangman game. The other has Russian, with an easy method for learning the Cyrillic alphabet. George Earl.

German Vocabulary Drill* A drill-practice program for German to English or vice-versa. The teacher, parent, or student can develop specific files. A score summary is presented at the end of this program. Sliwa Enterprises.

German Vocabulary Drill* Contains three types of language practicums: matching, English-to-German, and German-to-English. Disks can be modified by the student for varying levels of difficulty in the thirty lessons offered. 48K. Powersoft.

Gertrude's Puzzles* Young children can create puzzles with the help of Gertrude the Goose. There is a choice of six puzzle rooms, some more challenging than others, and puzzles that will even stump adults. The Learning Company.

Gertrude's Secrets* Teaches children, ages four to nine, about logical thinking, how to create order, and how to plan ahead. They must solve puzzles while playing with shapes and designing new shapes. The Learning Company.

GET BASIC Statement. Used to detect a single-character keyboard response. The format is:

```
GET A
  or
GET A$
```

Following the above statement, you should have a statement to check the value of the response, such as:

```
IF A$ = CHR$(<n>) THEN <line number>
```

You may GET either a numeric (A) or string (A$) variable; <n> is the ASCII value of the character which you want as the response and <line number> represents the line number of the next logical statement. Because all executable statements following THEN will be ignored if the expression following IF evaluates as false, the alternative move should be in a separate program line following the one shown above, and should usually be a reference back to the original GET line, as follows:

```
1000 GET A$: IF A$ = CHR$(32) THEN 2000
1010 GOTO 1000
```

The above example will check for pressing the space bar [CHR$(32)]. See IF...THEN.

GETLN Monitor routine. The GETLN routine allows the input of an entire string from the keyboard, with each keypress being stored in a buffer, until the operator presses RETURN. The converse is RDKEY (q.v.).

GI General Instruments, a manufacturer.

Gibson Mix A statistically balanced mix of instructions that is representative of general data processing applications. It is one of many variations used for benchmark testing. See Benchmark Program.

Glitch A pulse or burst of noise. A small pulse of noise is called a snivitz. The word glitch is usually reserved for the more dangerous types of noise pulses which cause crashes and failures.

GLOAD An Apple III Business BASIC command which instructs the operating system to load a graphics display from disk. This command moves the display from disk to the computer's graphics buffer. The process replaces any image currently residing in the buffer with the image being loaded.

Global Program Line Editor* A program sold by A.P.P.L.E. of Kent, Washington (see Users Groups). This program can be loaded in a protected part of memory. It automatically sets HIMEM (q.v.), after which you may load any Applesoft program that you'd like to edit. Use the commands provided by G.P.L.E. to find and change variables, re-set line numbers, and do a host of other editing tasks. A.P.P.L.E.

Global Variable A variable whose name and value are accessible throughout the program or application system. Contrast with a local variable, accessible only within the block where it is defined.

Glossary One* An extremely useful utility for anyone using Apple Writer II and an Epson printer. It will load a glossary file of print commands, type fonts, and special characters, which may then be called with CTRL-G and one or two other keys. The assigned mnemonics make it very easy to remember which key to press. For example, CTRL-G-E turns on emphasized type and CTRL-G-E turns it off; CTRL-I turns on italic printing and CTRL-i turns it off. While a glossary file can be built from the beginning, this program takes all the work out of it, and allows you to use the complete capabilities of your word processor and printer. Mike Iverson.

GL-Plus* An accounting tool that produces reports. This is a very versatile program that can handle general accounting practices, even for a number of companies. A number of reports can be printed easily including general journal, general ledger, balance sheet with ratio, customer and supplier, accounts receivable/payable, income statement, and more. It's very user friendly. Great Divide Software, Inc.

GND GrouND.

Go The DDT program is available in CP/M to correct any program errors encountered during PIP, ASM, or LOAD. DDT loads the file containing the error into memory. Once DDT and the program have been loaded, any of DDT's commands can be used to view and change the program to be corrected. I is a DDT command which inputs the file to be corrected into memory. R is a DDT command which reads the file in memory and gives the user the information he requires to save the corrected program properly. G is the GO command in DDT. This command ends the operation of DDT and leaves the corrected program in memory so that it can be saved to disk as a corrected file.

GO—Monitor Command When you call the Monitor (CALL-151, from BASIC), the contents of the 6502 registers are stored in memory starting at location $45 (decimal 69). The values are stored in the order A, X, Y, P, and S. You can then enter a Machine language program; when you issue the GO command (in the form {address} G) the monitor loads these five registers again from memory and then executes the program. The GO command is the Machine language equivalent of BASIC's RUN.

Goals Analysis* Use this series of three programs to help establish your, or a client's, financial goals. The Compound Interest Analysis program lets you project the effect of interest, on invested capital, over time. Withdrawal Analysis shows the effect of withdrawals from a cash fund, over time. Savings to Meet Withdrawal Goals shows the amount you must save over time, to achieve cash withdrawal goals. RE/International Systems Corporation.

GOCI Systems Plus Business Accounting Package* The GOCI (George Otis Companies, Inc.) Package is a comprehensive business management system. It requires an Apple II+ with at least 48K of memory, two DOS 3.3 disk drives, a monitor, and a printer. It operates on the Apple IIe computer with 64K of RAM and with Applesoft in ROM. It is available for the Apple III with 128K or more of RAM, Business BASIC, and SOS. It is available in 5 ¼ inch floppy disk and hard disk versions. This package consists of menu-driven modules which provide the means for a business to budget costs, track accounts payable, track accounts receivable, control inventory, handle order processing, manage payroll, manage fixed assets, and run a general ledger.

The Accounts Receivable modules can handle up to 2500 customers in the floppy disk version and up to 15,000 customers on hard disk. The inventory module can handle up to 7500 items in the floppy disk version and up to 30,000 items in the hard disk version. The Accounts Payable module can handle up to 2500 vendors in the floppy disk version and up to 15,000 in the hard disk version. The Payroll module handles all federal and state withholdings and reports for up to 200 employees on the floppy disk version, and up to 500 employees on the hard disk version. The Fixed Assets module has a capacity for 10,000 items, and the General Ledger module can handle up to twenty departments with up to 250 accounts in the chart of accounts for the business. The system also offers banking reports and disbursement reports, and can sort all of the files maintained by the system. As each particular file is updated, the files which are chained to this file are also updated. The Fixed Assets module handles all types of depreciation including ACRS. This package is quite complete and effortless to use. DOS 3.3; two disk drives; CRT; printer. GOCI Software.

Going Together—Scatterplots & Correlation Coefficients* Designed to teach the relationship between variables, including how to use a scatterplot graph and the meaning of the term correlation. The student can alter the type of review that takes place, the order of lessons, and the quiz level. Additional programs are available, including What's the Score?, On the Average, and Off Center. Micro Power & Light Company.

Good Health Habits* Presents basic health concepts in a fun and games format. Topics include care of teeth and eyes, and good sleep and nutritional habits. Disk or cassette. Right On Programs.

Goodspell* A spelling correction program that is both fast and easy to use. Includes a 14,000 word dictionary that can be updated with foreign, technical, and uncommon words. The program will also print out hard copy of each misspelled word and label the error printouts for review later. 48K; compatible only with 16-sector Apple Writer disk. Apple Computer, Inc.

GOSUB and RETURN BASIC Statements. GOSUB and RETURN are used in conjunction and function to branch to and return from subroutines. The format is:

```
GOSUB<line>
.
<line>(begin subroutine)
.
.
RETURN
```

<line> is the line number of the first line of the subroutine.

You can call a subroutine using GOSUB any number of times in a program and a subroutine may be called from within another subroutine.

The RETURN statement causes BASIC to branch back to the statement following the GOSUB statement from where it exited. A subroutine may contain more than one RETURN statement (if you want to return from different points in the subroutine). You may place subroutines anywhere in a program. In order to keep your program from entering a subroutine that should not be executed, it may be necessary to use a STOP, END, or GOTO statement to direct program control around it.

See ON...GOSUB and ON...GOTO.

GOTO BASIC Statement. The GOTO statement is used to exit from the normal program sequence to a specified line number. The format is:

```
GOTO<line>
```

<line> is the line number in the program you want to execute next.

The <line> specified after GOTO will be executed if it is an executable statement. If <line> is a non-executable statement, such as DATA or REM, then the program will continue until it finds the first executable line after that.

In debugging, the GOTO statement can be used in direct mode to reenter a program at a desired point.

See ON...GOSUB and ON...GOTO.

GOTO Or, GO TO. A branch instruction in a high-level language.

GP General Purpose.

GP1024 Color Printer* A color ink-jet hardcopy device that combines color, text, and graphics in a single unit. By using silent ink-jet technology, the GP1024 supplies complete eight-color hardcopy with up to 125 shades. The device's resolution exceeds most commercially available graphic CRTs. With 120 dots per inch, the GP1024 prints up to 1440 dots in the horizontal and 85 dots per inch in the vertical. Enough ink for 500 typical graphic images is supplied by a disposable snap-in cartridge. The carriage of the GP1024 has a rated life greater than 6000 hours MTBF. The color head has a proven reliability of greater than 19 billion operations. PrintaColor Corp.

GPIB General Purpose Interface Bus. The IEEE 488-1975 interface bus standard. Also called ANSI Standard MC 1.1-1975, or the IEC Bus in Europe.

GPLE An abbreviation for an editing package called Global Program Line Editor. This editor is made up of several programs which enable the user to edit programs written in Applesoft BASIC or Integer BASIC. Editing may be accomplished line by line or by making global changes; the program may be used in the 40-column mode or with 80-column video display cards.

GPLE is loaded into a memory expansion card rather than into the Apple's RAM. The program checks for a memory expansion card as it is being loaded; if the expansion card is not present, a 48K version is loaded into RAM. Available editing commands allow a specific character to be deleted, the restarting of the editing process, the removal of unnecessary blank spaces, and the conversion of upper case to lower case and lower case to upper case. Global editing features are also available, including global search and global replace. This program has a typehead feature which allows thirty-two characters to be typed while most commands are being executed.

The GPLE disk contains a program called DOS Mover which relocates DOS from RAM to the language card, ESCape Save which enables the user to define ESCape key functions, and Config GPLE which allows GPLE to be configured to a 40-column or 80-column display. The program is extremely useful for anyone who writes programs, from a beginner to an experienced programmer. A.P.P.L.E.

GR BASIC Command. Turns on the soft switch which displays only four lines of text at the bottom of the screen and leaves the top twenty lines for use in a 40 by 40 grid of blocks for low-resolution graphics display. See Screen Soft Switches.

Gradebook* A ten-program package designed as a teacher's aid in recording students grades. Keeps track of students in the classroom and their overall performance. 32K. Sensational Software.

Grader, The* A teacher's aid in keeping an up-to-date progress report for individual students. It allows for the calculations of percentages, mean, and statistics. Each list is alphabetized and data may be entered, edited, or deleted. 48K. COM Press.

Grading Systems Program* Calculates grades, averages, and credits for each student. At the beginning of each grading period, student schedules and homeroom rosters are produced. At the end of each grading period, Honor Roll rosters and report cards are created. A light pen is included for easy use. Printer. Charles Mann & Assoc.

Gradisk* Records students' names and identifications. Thereafter, grades may be entered with an up-to-date progress report for each individual. 48K. John Wiley & Son, Inc.

.GRAPHIX Driver The graphics driver for the Apple III computer; a program that enables the user of an Apple III to create graphics displays onscreen from keyboard input. To use this driver, move it from the disk utility disk to a systems disk or a Business BASIC working disk. It is accessed by typing the following:

```
OPEN #1, ".GRAFIX"
```

This program is part of the systems utility disk that comes with the Apple III.

GRAFIXMODE GRAFIXMODE is a routine available on the Apple III computer in Apple III Business BASIC when BGRAF.INV has been invoked. This routine sets the graphics display required by the user and selects a display buffer for his use.

GRAFIXON GRAFIXON is a routine available in Apple III Business BASIC after the graphics module has been invoked. It displays the contents of graphics buffer on the screen.

GraFORTH* GraFORTH is a specialized language developed by Paul Lutus, the author of AppleWriter I and AppleWriter II, for use in making high-resolution, color and three-dimensional graphics displays with animation. The language is compiled rather than interpreted; therefore, it runs faster and provides more realistic animation than is possible in BASIC. While GraFORTH is similar in some ways to other versions of the FORTH language, it has been changed to make it specifically applicable to the graphics mode.

The manual comes in two very readable parts: a reference manual for the GraFORTH language (which includes a tutorial) and an animation guide. For those who already know LOGO, there will be similarities to this language also, especially in the Turtlegraphics and in the necessity for using spaces to delimit words (commands/statements). Unlike Applesoft BASIC, which has a parser to make sense of short-cut typing, spaces are very important in using GraFORTH. For those already familiar with some other version of FORTH, the use of stack and Reverse Polish Notation will be familiar; to the BASIC programmer, this is a whole new world.

The complete disk contains open, unprotected files so that you can make as many backup copies as you need. The files are copyable with any copy program such as CopyA which comes on the Apple II/II+ System master. The demonstration program shows the three modes of graphics display, the special available character sets, and also includes the technique of reverse scrolling (from the top to the bottom of the screen). Insoft, Inc.

Grafpak* Prints either horizontally or vertically. Pages can be printed together and be perfectly registered. Full screens or partial screens can be printed and there are no restrictions on where the image is cropped. Figures on a range of scale factors based on size of window to be printed. Smart Ware.

Grammatik* A system that can correct word and sentence structure as well as spelling. Displays the entire document on the screen, makes the corrections as you go, and directs either to the printer or to the disk. Digital Marketing.

Gram-Molecular Mass* A random synthesis of inorganic compounds. Students must calculate the gram-molecular masses. Microphys Programs.

Graph Fit* Produce pie, bar and line graphs in hi-res. It also has automatic scaling. Micro-Ware Distributing, Inc.

Graphic Integration Theory* Development of the inner rectangular sum, outer rectangular sum, and integration as the limit of rectangular sums. Menu selection provides for choice of graph and number of intervals, and also allows the user to supply both the lower limit and the upper limit of integration. 32K. Math Software.

Graphic Software for Microcomputers* Design your own software with this do-it-yourself package. It contains sixty-one programs which features rotating, clipping, scaling, shading, and more in 2-or 3-D. 48K; BASIC. Kern Publications.

Graphic Solution* A versatile and powerful program which creates graphs, images, and text for education, business, or scientific applications. Additional options for 3-D illustrations and slide shows are included. 48K. Accent Software.

Graphic Writer* Use different "type fonts" (i.e. Roman, Gothic, or Mirro) for added effects on text. Editing and print formatting are available to the user. 48K. Computer Stations, Inc.

Graphical Analysis* Designed for scientific applications. A maximum of thirty-two data pairs can be plotted and labeled on hi-res graphic charts. Nine modes of operations are included (i.e. save, load, display, edit, and variable comparison). 48K. Vernier Software.

Graphics, High-Resolution See High-Resolution Graphics and Screen Soft Switches.

Graphics, Low-Resolution See Low-Resolution Graphics and Screen Soft Switches.

Graphics Configuration Block If the Apple III user were to select the edit drivers option of the System Configuration program on the utilities disk, and then were to select the graphics driver for editing, the graphics configuration block would be displayed on the screen for editing. This configuration block contains parameters for the graphics mode, the transfer option, the x and y position of the cursor, the viewport edges, pen color, fill color, character font address, character cell height and width, and similar information which controls graphics display. The Standard Device Drivers Manual should be consulted prior to editing the contents of the graphics configuration block.

Graphics Cookbook for the Apple* Written by Nat Wadsworth. This book explains a method for constructing shapes and pictures using low-resolution graphics, which does not require add-on Machine language sub-routines. In keeping with the title, there is a selection of 100 pictures which include background scenes, objects, shapes and forms. Both illustrations (looking very much like patterns for cross-stitch embroidery) and data statements containing the x-and y-coordinates are provided. The actual method is a BASIC program which reads the coordinates from the data statement and implements them in the colors indicated by the main program.

A section is included on the creation of a low-resolution character set, which would be especially useful in primary education programs. Some of the pictures are rather simple (knife, small flying saucer, small pipe); others are considerably more complex (border #3, background #2, butterfly, fireplace) and are well worth the time spent to key them in and save them as text files for use in later programs. Geared toward an eighth grade reading level. Hayden Book Company, Inc.

Graphics Display—Apple III Business BASIC The Apple III graphics display can be described as being a rectangular display with the zero coordinate for the X vector being located in the lower left corner of the screen. The horizontal or X values increase from left to right. The origin for the Y axis is also in the lower left corner of the screen. Y values increase from the bottom toward the top of the screen.

There are four graphics modes available on the Apple III computer through Apple Business BASIC. The modes are differentiated from one another by the colors they display and by the number of X and Y positions available to the user for plotting dots and lines. Each graphics display mode is designated by a number from 0 to 3. Mode 0 is black and white. It uses 280 horizontal (X) positions and 192 vertical (Y) positions for plotting points. Mode 1 is a color mode with sixteen colors available effectively for two color graphics rather than multiple color graphics as colors tend to bleed horizontally. It uses 280 horizontal positions and 192 vertical positions for plotting. Mode 2 is a black and white which uses

560 horizontal positions and 192 vertical position for plotting. Mode 3 is a color mode with sixteen colors available at every position. It uses 140 horizontal positions and 192 vertical positions for plotting.

Graphics displays are held in a graphics buffer until they are called to the screen. In certain graphics modes, more than one buffer is available. In those cases, a display can be created in the buffer while another display is being shown on the screen. Graphics routines are available only after the .GRAFIX driver has been loaded and after BGRAF.INV has been invoked. This routine moves the program in use out of the memory area required for the graphics mode the user has selected. Color control routines are then accessed as needed, or by the program, as are plotting routines. Viewports can be set and changed as required. Finally preplotted graphics displays can be loaded and displays created with the graphics routines; they can be saved as required.

Graphics Display Modes The Apple III computer has four different graphics display modes available to the user. These modes are 280 by 192 pixel black-and-white, 280 by 192 pixel limited color, 560 by 192 black-and-white, and 140 by 192 full color. These modes are selected by inserting a specific mode number into the graphics configuration block of the Graphics Driver.

Graphics Driver, The Shown as .GRAFIX Driver on the Apple III utilities disk. See .GRAFIX Driver.

Graphics Library* Twenty disks offer approximately 700 characters to the user. When used with other programs, you may draw and color images. 48K. California School for the Deaf.

Graphics Library, The* Over eight hundred images on twenty disks to go with the author's language. San Juan Unified School District.

Graphics Magician, The* Add graphics to adventure games and create a new kind of Apple shape that includes color and angular movements. Designs object tables through program prompting and then animates the objects by calling the animation routines. Creates hi-res pictures that may be saved. Uses an improved version of 100 color-fill routines and paintbrush routines from those packages. Penguin Software.

Graphics Memory Requirements Each of the graphics display modes on the Apple III computer has specific memory requirements which must be protected to use the capabilities of a particular graphics mode. The 290 by 192 black-and-white mode uses 8K. The 280 by 192 limited color mode, the 560 by 192 black-and-white mode, and 140 by 192 full color mode each use 16K.

Graphics Package* Will turn a graphics-equipped printer into a plotter to make graphic ephemerides, charts to fit dials, etc. You can either use the graphics that come with the program or make up your own. AGS Software.

Graphics Packages See Random Walk, A; AB-3D1 Basic 3D Graphics; Accu-Shape; Additional Fonts and Character Sets; Adventure Creator; ADWAR ARS 170A; Alpabytes; Ana I; Anadex (Model 9501) Graphics Software; Apple Data-Graph 2.1; Apple II Business Graphics; Apple Plot; Apple World; Applegraphics II; Applesack 6—Music & Graphics; Applewriter Graphics; Artist's Designer; Artist, The; Auto Graphics; A2-GE1 Graphics Editor; Graphics Package; Banner Magic; Banners #1; Bar Graph; Bio-Printer; Block Shapes for Applesoft or Assembly; Brighterwriter Graphics Software; Bus Rider; Character Generator; Chart Master; Chart Writer: Written Natal Report; Circle Graph; Coloring Board, The; Combined Enhanced Graphics Software; Complete Graphics System, The; Computer Graphing Experiments—Vol. 1, Vol. 2, Vol. 3; Computer Palette; Computer Portrait Subsystem; Country Combo; Creativity Tool Box; Criaturas Excepcionales; Crystal Systems; Curve; Curve—U.S.A.; Curve Copy; Curve Fitter (by Interactive); Curve Fitter (by Sensational); Curve II; Curve—Fit; Curve's Three—D; CyberLOGO Turtle; Cycle Graphs; Data Plot; Data Reporter, The; Data—Graph; Dee—Zigns; Demo—Graphics; Designer, The; Designer's Toolkit; Dithertizer II Video Digitizer; DMP Digital Plotters; Edu—Paint; Enhanced Graphics Software; Executive Briefing System (by Lotus); Executive Briefing System (by Professional Software Technology); Expansion Pac—I & II; E-Z Draw; E-Z Draw 3.3; E-Z Graph; Fancy Border; Follow the Dots Coloring Book; G.A.P. (Game Animation Package); Geoboard Geometry and Measurement; Grafpak; Graph Fit; Graphic Integration Theory; Graphic Software for Microcomputers; Graphic Solution; Graphic Writer; Graphical Analysis; Graphics Package; Graphics Library, The; Graphics Magician, The; Graphiti Is Yours; Graphtrix; Higher Fonts I; Higher Graphics II; Higher Text; Higher Text II; Hi-Res Secrets; Illustrator, The; Image Printer; Limits of Sequences; Low Resolution Shapewriter; Low-Res Sketch Kit; LPS II Light Pen System; Machine Language Graphics; Magic Paintbrush (Graphics and Games); Magic Spell; Make a Monster; Marquee; Math II; Micro-Painter; Micromap II; NEC Spinwriter Graphics; Novelties; Paddle

Graphics; Paddle Shapemaker; Paintre Power; Pascal Animation Package; Pascal Animation Tools; Pascal Graphics Editor, The; Pascalgraphics (formerly Pascal TigerGraphics); PGS (Professional Graphics System); Pilot Animation Package; Pilot Animation Tools; Poor Man's Graphics Tablet; Rainbow Graphics; Scotch Plaid; Scotts Voice Based Learning; Screen Machine; Screen Scribe; Shape Builder; Shape Editor; Shape Magician, The; Shape Master; Shape Package, The; Shape Tables—Volume 1; Slide Select Program; Slide Show, The; Soap (Stock Option Analysis); Soft Seventy; Solids of Revolution; Space Tablet, The (A 3-D Graphics Tablet); Special Effects; Specsystem; Stereo Generator, The; Strobe Plot; Super Draw and Write; Super Pix Software; Super Shape Animate; Super Shape Draw; Super Sketch; Superplot; Superplotter, The; Tablet Graphics; Tablet Shapemaker; Tapestry; Taylor's Series Approximations; TEKSIM the Apple II; Three Mile Island Special Edition; Turtle; Typefaces for Apple Mechanic; U—Draw II; Ultra Hi-Res Graphics; Ultra Plot; Useable Graphics—Demo Disk I; Variable Message; VB—3 MicroKeyer; Vector Sum; Versa Writer; Video Loom II; Video Marquee; Vidichart; VisiPlot; Visi-Trend/Plot; Width Adjuster; Zapper; Zoom; Zoom Graphix; 3-D Supergraphics and Game Development System; 3-D Surface Plotters; 100-Color Drawing System, The.

Graphics Printing System* Features the ability to print on the whole screen or a portion of it. Graphic characters are printed in hi-res. Progressive Software.

Graphics Tablet* Allows you to enter graphics information directly to the screen, rather than having to use a program or a joystick. Graphics tablets range from small and relatively inexpensive (Koala Pad) to highly sophisticated and more expensive versions. 48K; Apple Computer, Inc.

Graphing* A menu-driven program designed for mathematical applications. The student can master algebraic problems dealing with slopes, intercepts, graphing, and plane coordinates. After studying sample problems, and definitions, the student may chose between one and twenty practice problems. 48K. Micro Power & Light Company.

Graphiti Is Yours* Use your imagination as you draw hi-res shapes. The images may be saved, recalled, and edited. An instruction manual is included. 48K. Micro Power & Light Company.

Graphtrix* A graphics screen dump that can be called from your Applesoft program. There is a graphic call command or automatic footnote formatting. Apple II can output graphics to printer. Data Transforms.

Grappler, The* A parallel interface board for your Apple computer comes with firmware to copy the Apple hi-res graphics to the printer. This is a very powerful interface to Centronics-type printers. There is a double-size print option, inverse print modes, and more. Orange Micro, Inc.

Greater Than Logic operator. The symbol used is > where a statement A > B stands for variable A having a greater value than variable B. It is usually used as part of the expression in an IF...THEN (q.v.) statement.

```
950 IF A > B THEN GOTO 1000
```

The same comparison may also be used for comparison of strings to sort (q.v.) in alphabetical order. For example, if A$ = "APPLE", B$ = "ARTHUR" and C$ = "ALLAN", the following comparisons would evaluate as indicated:

A$ > B$ (false—As are equal, but P has a lower ASCII value than R) A$ > C$ (true—As are equal and P has a greater ASCII value than L).

Greeting Program Program which is run when diskette is booted (q.v.). See Initialize a Diskette and HELLO.

Gregg Keyboarding for Information Processing* This course was developed with particular emphasis on teaching the computer keyboard and efficient keying practice. The course is taught on the microcomputer so the student learns in a realistic environment. The program is broken down into thirty-two short lessons for self-paced learning. DOS 3.3. McGraw-Hill Book Company.

Grocery List* Organize your supermarket shopping with this program. You can file as many as 400 items of your choice, select items with one keystroke, and organize your trips to the market by section number, table, and department. Has a 100-item master file. 48K. Computerized Management Systems.

Ground The point of reference in an electrical circuit (not necessarily the physical ground). The ground point is considered at nominal zero potential, and all other potentials in the circuit are compared with it.

Grounded Outlet The use of a grounded outlet prevents the rare occurrance of the computer case becoming "hot" and carrying 110v of current, which could cause a painful shock—to say nothing of causing irreparable scrambling of the data in the computer. For this reason, the Apple power cord is a three-wire cord, with the round plug going to ground. You should never attempt to defeat this wiring by the use of an adapter. See Surge Protection.

GSAVE GSAVE is the Apple III Business BASIC command for saving a graphics display onto a disk or other block device. The use of this command would resemble the following example:

```
PERFORM GSAVE."FISH PICTURE"
```

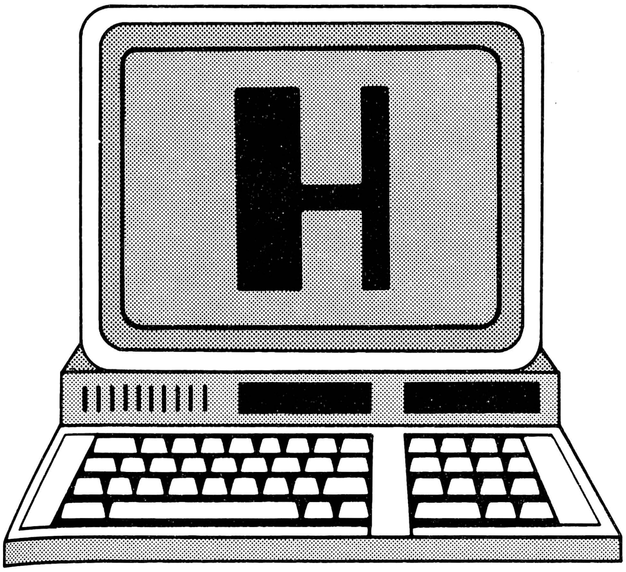
This file would then be saved as a GOTO file.

GT Greater than (also represented by >).

Guardian Angel* A power backup to protect against power line interrruptions and brown-outs. Available in 115 volt or 220 volt, 50 or 60 hz, and 150 watts. Has automatic warning tone during power failures. This unit also allows you to operate your system from a 12-volt source, such as your auto cigarette lighter. RH Electronics, Inc.

Guess the Rule* You must guess the secret equation of the computer in an algebra guessing game. Using the hints supplied by the computer, the player must develop the concept of function and become familiar with ordered pairs and with tables of values. Builds skill in arithmetic, logical thinking, and writing equations. Disk or cassette. Steketee Educational Software.

Gusher* Designed for oil and gas well operators, this package automates joint interest billing and revenue distribution. 48K; Apple Pascal system; two disk drives; printer. High Technology, Inc.



H Codes. ASCII = 72, HEX = 48. h—ASCII = 104, HEX = 68.

H Hexadecimal. Used as a suffix to denote hexadecimal numbers in Intel format. Also, High—the most significant half of a register or a pointer, usually bits 0 to 7 of a 16-bit word. Used in naming the high part of the 8088 registers: AH, BH, etc.

H—PIP Command The PIP command in CP/M allows files to be copied from one disk to another for backup or conversion purposes. PIP allows the use of parameters to dictate how the file will be treated or processed during the copy procedures. If the letter H is placed in brackets immediately following the new file name, its extension, PIP command statement for copying a file in hexadecimal format, the file will be checked to ensure that its data is in the proper HEX format.

Haber—Ammonia Synthesis* An investigation of the system at equilibrium and an investigation of the kinetics of the Haber process. 48K; DOS 3.2.1 or DOS 3.3. Conduit.

Haciendo Los Numeros* Equivalent to "Make a Number," this program offers exercises on using the four basic arithmetic functions. Grade levels two through four. 32K; Applesoft. NTS Software.

Hail to the Chief* An election simulation program in which you manage your own presidential campaign. Carry out your strategy week-by-week, plan advertising, traveling, speaking engagements, news conferences, and debates with your opponents. Major issues are presented on which you must take a stand. Four models are included, each having ten levels of difficulty. This package was designed for use at the college level, in courses on political science, sociology, computer science, etc. Sensational Software.

Half-Carry The carry from bit 3 into bit 4, which is required for correct addition of packed BCD numbers, where two BCD digits reside in one 8-bit byte.

Half-Duplex A mode of communication in which data may be transmitted in only one direction at a time.

Halt When a computer stops all activity.

Halt System Operation See Control Characters and Reset.

Hamming Code A 7-bit, error-correcting code named after the inventor.

Hand Holding BASIC* An excellent teaching system for the beginning BASIC programmer. Designed by Apple, it contains extensive debugging and tutorial routines. The program checks your program input character-by-character, notes your syntax errors and makes suggestions on how to correct them, and uses six screens to show you how your programs run line-by-line. Four levels of instructions are included, beginning with the arithmetic functions and progressing to ANSI Minimal BASIC in level 4. Apple Computer, Inc.

Hand/Eye Coordination* Includes Write in Color, which lets students type words in color and create their own combinations of letters and words; Computer Pallette, in which students use sixteen colors to paint the screen; Cooperation Maze, where players work together by moving the cursor through a maze; and Make A Tune, in which the player uses notes to program a tune. Recommended for early elementary grades. DOS 3.2 or DOS 3.3. Edutech Corp.

Handicapped Typewriter* Software for seriously disabled people who cannot use a typewriter. A keyboard is shown on the screen and a scanning cursor selects the characters desired. A phrase dictionary, a calculator, a user-definable dialing and answering service, a telephone directory and a dialing and answering service (using a loudspeaker phone and environmental controller) are available with advanced versions. Rocky Mountain Software.

Handler A program used to control or communicate with an external device, such as a diskette drive.

Handshake Handshaking is a term used in serial and parallel communications to describe when one device is temporarily unable to receive more data until a buffer is cleared, a line is printed, etc. Electronic signals are passed from one device to another to indicate readiness to receive or transmit data. Initially, the sending device transmits a ready to send signal. It then waits for a ready to receive signal from the receiving device. When this signal passes, sending is carried out until another "not ready to receive" signal is sent. Then transmission ceases until the ready signal passes again. This process of signaling readiness is called handshaking and the signal is called a handshake.

Handshaking A basic communications synchronizing technique using two signals: 1—ready ? ; 2—yes/no acknowledgment. The handshaking procedure is carried out prior to any data transfer, when establishing a connection between two data communication devices. For example, a CPU will ask an I/O, "Is input buffer 1 empty?" If yes, it can be reloaded. If no, the CPU must wait.

Hard Copy Computer output printed on paper.

Hard Disk A disk composed of a magnetic coating applied to a rigid substrate, such as aluminum or ceramic. The term is generally used in contrast with "soft" (floppy) disks, which are flexible. Floppy disks are slower and have less storage capacity.

Hard Disk See Corvus Mirror; Cyberdrive; Mate—I; MECC Apple Demonstration Disk; PHD; ProFile; and Winchester Hard Disks. Also see Hard Disks—Add-On Memory.

Hard Disk Crash Unlike the floppy disk drives which are standard for the Apple (where the read/write head comes in contact with the diskette surface), the read/write head in a hard disk rides slightly above the surface of the diskette on a cushion of air. In this way, the disk may turn at a much higher speed, increasing the rate at which data is transferred. If dust particles get into the hard disk drive, the cushion of air may collapse and the head would then contact the disk; this causes a much greater degree of deceleration, and, because of the greater amount of information stored on a hard disk, a consequent greater loss of data. Most hard disks are now sealed systems to prevent this contamination.

Hard Disk Drive Hard disk drive systems are high capacity storage systems which can be connected to a microcomputer system such as Apple II, Apple II+, Apple IIe, and Apple III systems. These storage systems use large, hard plastic disks which are magnetically sensitized to allow data to be written to them, stored, and read from them. Data is written to these disks and read from them by a read/write head which never touches the disk. If it should touch the surface of the disk, a "hard disk crash" or "head crash" is said to have occurred. Things to weigh prior to buying a hard disk system are: its rotational speed, whether or not the disk head is cushioned by an air stream, whether or not the disk is removable, its capacity, and the effectiveness of its cooling techniques.

Hard Disk Systems—Apple Compatible A number of hard disk storage systems are available for use with Apple computers. One of these systems is produced under Apple Computer's name for the Apple III computer. The rest are manufactured by independent companies for Apple and other microcomputers. These systems are identified and generally described below:

Manufacturer	Computer	Description
A.M. Electronics 2809 Boardwalk Ann Arbor, MI	II, II+, IIe	Densi RD 5067, 5 meg. Uses DOS, 6.7 mini-Winchester.
A.R. Bus. Sys. 1128 Alcosta Avenue Glendora, CA	II, II+	DS 105, DS 110, DS 220. Uses DOS, 5/10/20 meg.
Apple Computer Inc. 20525 Mariani Ave Cupertino, CA	III	Profile. Uses SOS, 5 meg.
Cameo Electronics 1626 Clementine Anaheim, CA	II, II+	2005, 2020, 1050. Uses DOS, 5/10/15 meg.
Compukit 16206 D Hickory Knoll Houston, TX	II, II+, IIe	5 meg Hard Drive, 10 meg Hard Drive, 15 meg Hard Drive. Uses DOS.

Manufacturer	Computer	Description
Computer Dynamics 105 So. Main Greer, SC	II, II+	Win 5, Win 10, Win 15. Uses DOS, 5/10/15 meg.
Corona Data Systems 31324 Via Colinas #110 Westlake Village, CA	II, II+	Starfire 5, Starfire 10. Uses DOS, 5/10 meg.
Corvus 2029 O'Toole Avenue San Jose, CA	II, II+, III	Model 6, Model 11, Model 20. Uses DOS & SOS, 7/14/21 meg.
Davong 217 Humboldt Ct. Sunnyvale, CA	II, II+, III	DS 1512. Uses DOS, SOS, Pascal CP/M. 5/10/15/21/32 meg.
Genie Computer Co. 31131 Via Colinas #607 Westlake Village, CA	II, II+	5 + 5. Uses DOS, Pascal. 5 meg.
I Q Systems 2931 La Jolla Street Anaheim, CA	II, II+	Graymatter 5, 10, 20. Uses DOS, CP/M. 5/10/20 meg.
Interface, Inc. 7630 Alabama Ave Canoga Park, CA	II, II+	I2BM 5, I2BM 10, I2BM 15. Uses DOS. 5/10/15 meg.
Lobo Drives Int. 358 So. Fairview Avenue Goleta, CA	II, II+	950M, 1850M. Uses DOS. 4.9/8.2 meg.
Mountain Computer 300 El Pueblo Rd. Scotts Valley, CA	II, II+, III	ST506, ST406, ST412, ST419. Uses DOS, Pascal, SOS. 2.5/5/10/15 meg.
Percom Data Corp 11220 Pagemill Rd Dallas, TX	II, II+	PHD-5, PHD-10, PHD-20. Uses DOS, CP/M. 5/10/20 meg.
Quality Computer Svc. 178 Main Street Metuchen, NJ	II, II+	DSK 62, DSK 63, DSK 64, DSK 73, DSK 77. Uses DOS, CP/M.
Quentin Research 9207 Eton Street Chatsworth, CA	II, II+, IIe	Q505, Q510, Q515, Q520, Q531. Uses DOS 3.2, DOS 3.3, CP/M, Pascal. 5/10/15/20/31 meg.
Santa Clara Systems 1860 Hartog Dr San Jose, CA	II, II+, III	SES-5/5R, SES-10/5R, SES-15/5R. Uses DOS, CP/M, Pascal, SOS. 5/10/15 meg.
Software Support One Framingham Center Framingham, MA	II, II+	Uses DOS. 8 meg.
Trantor Systems 4432 Enterprise St., #1 Fremont, CA	II, II+	TSL-5, TSL-10, TSL-15. Uses DOS, CP/M. 5/10/15 meg.

Manufacturer	Computer	Description
V R Data 777 Henderson B1 N-6 Folcraft, PA	II, II+, IIe	Hard Disk III. Uses DOS. 5/10/15/20 meg.
Worldwide Data 17321 El Camino Real Houston, TX	II, II+	Prometheus. Uses DOS. 5/10/15/20 meg.
Xacom Technology, Inc. 560 Forbes Blvd. So. San Francisco, CA	II, II+	853. Uses DOS. 42.4 meg.
Xcomp 7566 Trade Street San Diego, CA	II, II+, III	PHD 10MB, PHD 8x8. Uses DOS, CP/M, Pascal, SOS. 10/16 meg.
Xiten Systems 16815 Hawthorne Blvd. Lawndale, CA	II, II+	Gallium-10. Uses DOS, CP/M, Pascal. 11.3 meg.

Hard Disks—Add-On Memory These memory devices can dramatically increase the amount of on-line memory available for processing. All the systems have at least five megabytes (five million bytes) of storage capacity. Hard disk memory allows you to store large quantities of data and access it extremely quickly, often ten to twenty times faster than standard floppy disk drives. Each of these systems comes complete with its own controller and ready to interface with the Apple. Contact the vendor for more detailed specifications for each unit.

Product	Vendor
AMS 5000 Megabyter	Sorrento Valley Associates
AMS 8000 Megbyter System	Sorrento Valley Associates
Minimega Series SCS-5 Hard Disk System	Santa Clara Systems, Inc.
Minimega Series SCS-10/F Hard Disk System	Santa Clara Systems, Inc.
Sabrina Series Removable Winchester Cartridge Disc Model SCS-10R	Santa Clara Systems, Inc.
Sabrina Series Removable Winchester Cartridge Disc Model SCS-20R	Santa Clara Systems, Inc.
Sabrina Series SCS-10 8″ Hard Disc Subsystem	Santa Clara Systems, Inc.
Sabrina Series SCS-20 8″ Hard Disc Subsystem	Santa Clara Systems, Inc.
Sabrina Series SCS-30 8″ Hard Disc Subsystem	Santa Clara Systems, Inc.
Sabrina Series SCS-120 8″ Hard Disc Subsystem	Santa Clara Systems, Inc.
Toaster Hard Disk System, The	XComp
XComp FR21, The	XComp
ZVX4 Megabyter	Sorrento Valley Associates
6AP Disk System	Corvus Systems
11AP Disk System	Corvus Systems
20AP Disk System	Corvus Systems

Hard Hat Mack* With three screens to choose from, you build a frame, collect scattered tools, or feed steel blocks into a rivet machine, all while dodging falling debris and a nasty OSHA inspector. 48K. Electronic Arts.

Hardisk Accounting Series, The* A financial accounting and management series that enables the owners of small businesses to make decisions based on well-organized information. Includes the following modules: General Ledger, Inventory, Payroll, Accounts Payable, and Accounts Receivable. 5M hard disk and a 32-column printer required. Great Plains Software.

Hard-Sectored Describes a disk in which the recording surface has been divided into sectors using non-alterable methods, such as a ring of holes in the disk itself. Contrast to soft-sectoring, which is done by the DOS INIT command and writes information on the diskette.

Hardware The boards, chips, wires, etc. of a system. Contrast with software (programs).

Hardware and Accessories See Acolyte, The; Amdeck Monitors; Apple Cat II; Apple Cooling Fan; Apple Disk Fixer; Apple Locker; Auto-Cat; BMC 13" Green Monitor; Carrying Cases; Cassette Interface; CMA Light Pen; Computer Security Lock; Copy System; Corvus Multiplexer; Corvus Winchester Disk System; Cosmobiological Dial Printer; Dispatcher, The; DOS Switch, The; Double Booter ROM; EI-2 Electronic Interface; Elite—Controller; Elite—Two; EPROM Socket Adapter; Expansion Chassis; Flex-Forth; Flexiterm; Flipper; Floppy Boxes; Furniture; GP1024 Color Printer; Graphics Tablet; Hays Stack Smartmodem; Health Temp-A VisiCalc Template; Hebrew Hardware; Hi-Fi Adaptor; Hipad Digitizer, The; HP7470 Plotter Demo; HX-12; Intelligent Card Reader (Model 1100-A); Intelligent Keypunch; Joystick (by TG); Joystick (by Kraft); Joystick, Game; Juke Box; Keyboard & Display Enhancer; Kleen-Line Regulator KLR-5000; LCG-1/LCG-2; Legend 128KDE Card; Light Pen; Lower Case Adapter ROM; Magazines; Magic Keyboard; Magic Type; Magnum Isolator ISO-17; MailMerge; Manual Rack; Mark I Epson Reinker; Mark II Epson Reinker; Mediamix ETI(2); Megaflex Universal Flexible-Disk Controller; Memory Expansion Cards; MicroFazer; Microprism; Microcomputer Use & Software Design No. 7884; Micromouse; Model 7712 Synchronous Serial Interface; Model 7720-01 A Parallel Interface; Model 7729-01 Centronics Printer Interface; NEC 1202 Monitor; Paddle Port Expanders and Extenders; Paddle, Game; PerfectData Micro Maintenance Kit; PerfectData Tech Maintenance Kit; PerfectData Type Element Cleaning Kit; PerfectData Video Display Cleaning Kit; PG1000 Color Printer; Power Supplies and Line Regulators; Ramex-128; Real Estate Templates; Remote Controller; ROMwriter; RS-232C DB25 Pin Reconfiguration Adapter, The; Sanyo Monitor; Serial Interface; Slick Switch; Slot Swappers; Slot 8 With Extension Switch; Smartype; Super Fan II; Superclock II; Sup'R Fan; System Saver; Tape Drive Controller Package; Translater; Trap 65; Ultra Disk Test; Video-300; Video-300A; Video-310A; Video-310G; V1100 8" Trimline Floppy Disk System; Wiremaster; Z-Term; 8" Disk Controller—The Disk 2+2; 256K App-L-Cache; 6502-C Processor Module; 7114-01A PROM Module; and 7470-01 DCD A/D Converter. For monitors mentioned above, see the product charts listed under Monitors, Color and Monitors, Monochrome and Black/White. See also Furniture; Joysticks, Game; Keypads—Add On; Power Supplies; and Line Regulators.

Hardware vs. Software Computer programs of all kinds are called software. Usually software is contrasted to hardware, the actual chips, wires, boards, etc. which make up the computer. A special case is read-only memory (ROM, q.v.), which is hardware that contains a permanent copy of software. These terms can create confusion. For instance, distinguishing which term applies to "BASIC ROM" and which means a ROM (hardware) containing a copy of a BASIC interpreter program (software). Such ROMs are often called firmware to distinguish them from non-program hardware and from software in changeable media (RAM, diskette, cassette, etc.).

Harmonic An integer multiple of a fundamental frequency.

Harmonic Distortion Distortion due to the signal's non-linear characteristics, resulting in output which includes harmonics of a harmonic-free sine input.

Harmonics and Arc Transforms* Produces a wheel-with-aspectarian and an Addey style chart in your choice of transform, arc or harmonic. AGS Software.

Harmonious Dictator* Instructs students in chord progressions. Each progression that is heard is noted using Roman numerals for chord functions and numerical symbols for chord inversions. It begins with tonic-dominant patterns and progresses to all diatonic chords, seventh chords, and secondary dominants with inversions. 48K. Micro Music, Inc.

Harmony Drills: Set 1* A supplement for accompanying harmony drills in *Ear Training, A Technique for Listening*. Aural recognition of diatonic chord progressions beginning with uncomplicated tonic/dominant root positions chords to complex patterns that use all diatonic chords in root position, and first inversion and tonic chords in second inversion. 48K. Micro Music, Inc.

Hayes Federal Tax Visicalc Tax Templates* A fast and easy way to help prepare tax return calculations. The program is formated for most tax return pages and tables. Hayes Computer Systems.

Hayes Stack Smartmodem 1200* An RS-232C auto-answer, auto-dial data communications system compatible with virtually all personal computers. Standard features are touch-tone or pulse dialing and direct connection to single or multiline telephones. The system can be program-controlled by any language through ASCII character strings. Operating parameters are changed with ease by a series of unique "set" commands and eight configuration switches. Smartmodem's operating level is full- or half-duplex up to 1200 baud. Seven LED indicators on the front panel provide a visual check of system status, and the user can monitor the progress of calls via an audio speaker. The system features automatic baud rate, parity sense, and word size detection. A two-year limited warranty covers the system. Hayes Microcomputer Products, Inc.

Hayes Stack Smartmodem* A direct-connect device that can be used with RS-232C compatible computers or terminals and can be program-controlled in any language by ASCII character strings. The device is designed to communicate with other computers or timesharing systems using the telephone. The Hayes Stack design allows other components to be stacked on top of the Smartmodem, producing a more compact system. Includes power pack, one modular telephone cable, and manual. Mini Microcomputer Software.

Hayes Terminal Program* This program, written in Machine Code, functions with the Hayes Micromodem and can be purchased either as a separate terminal program or with a modem card. Supports DOS 3.3, Pascal, and CP/M formats and is menu-driven. The program can answer, terminate, and originate calls with communication commands and create, receive, send, and list files with file commands. Modem. Hayes Microcomputer Products, Inc.

Health* Introduces students to areas of information such as first aid, alcoholism, smoking, drug addiction, and nutrition. Exams are in fill-in, multiple choice, matching, short answer, and true/false formats. 48K. Academic Hallmarks.

Health and Our Bodies* A slightly more advanced approach to the body and its biological systems than the manufacturer's program Our Bodies*. Each biological system is described as to its daily functioning, and how we should care for our bodies. Cassette. Right On Programs.

Health Maintenance Volume 1* Predict your chances of a heart attack. Also includes ingestion of toxins, calculation of energy level in comparison to calorie intake, and discussions of the six basic nutrients. 32K. Minnesota Educational Computing Consortium.

Health Maintenance—Volume 2* A two-program package which helps you keep your weight under control and gives you an overall view of your health according to your lifestyle. 32K. Minnesota Educational Computing Consortium.

Health Temp—A VisiCalc* Template* Contains templates which cover numerous aspects of nutrition, exercise, and health. Record progress in these areas as you exercise and eat your way to good health. Exec Systems.

Health-Aide* Achieve your desired weight with this calorie counter and menu planner. Monthly color graphs of the nutritional value of your daily food intake may be printed. 48K. Knossos, Inc.

Heart, The* Discover the many wonders and biological functions of this extraordinary organ. 48K. Avant-Garde Creations.

Heat Loss* A program for adults and students in seventh grade and higher, that solicits user-compiled data from your home and processes it to show dollar energy losses. The program also points out possible energy conservation measures that could be taken, their costs, and their savings return. 48K. Minnesota Educational Computing Consortium.

Hebrew Hardware* A package that enables your Apple to print Hebrew characters. The package is made up of an EPROM (which replaces the regular Apple character generator) and a software disk. When used with an Epson MX-80, the EPROM will generate Hebrew characters. Institute for Computers in Jewish Life.

Hebrew Reading* Designed for the beginning Hebrew student who has no knowledge of the Hebrew alphabet. Thirteen units present all letters and vowels. An optional sound tape, with proper pronunciation of letters and words, is available. Comes with quizzes and review material. Effectively used by children or adults. 48K. Institute for Computers in Jewish Life.

Hebrew Writer* Offers you two choices for using your Apple to produce Hebrew text. The text editor program turns the Apple into a typewriter for Hebrew. You will be able to print text, with or without vowels, and print Hebrew characters in different sizes. There are many editing commands that imitate word processing capabilities and offer flexibility. Comes with manual. Institute for Computers in Jewish Life.

Hebrew II* For educational purposes and everyday communication. You can type and edit a page of Hebrew text, use the program to label graphics, maps and pictures, and then print them. Text or picture can be saved to disk and then printed on the Silentype printer. Vowels cannot be printed. 48K. Anthro-Digital, Inc.

Hebrew II* Teaches students Hebrew spelling and typing. For education and everyday memos and notices. Write out and edit Hebrew text, one page at a time. Use it on the Apple II to label graphs, maps, and pictures. Printed pages can be submitted to the teacher and the page can be edited on the screen to show the corrections. 48K. Aurora Systems, Inc.

Hebrew II Plus* A limited capacity word processor that mixes Hebrew and English on the screen. Hebrew, with vowels, prints right-to-left on the screen. 48K. Aurora Systems, Inc.

Heliocentric Horoscope* Will handle dates between 1800 to 2000 A.D. Includes nodes, radius vectors, peripherals, and helio aspectarian midpoint list. AGS Software.

Hellfire Warrior* An expanded version of the Temple of Apshai*, with four levels of sixty rooms each. New monsters, dangers, and adventures will keep you in suspense. 48K. Automated Simulations.

HELLO The program that is RUN when you boot your disk, and loads the DOS image into memory, is conventionally called HELLO. However, this program may be called anything you wish—from your own initials, to BUENOS DIAS, to ALOHA. The HELLO program (regardless of what name you assign to it) can also be designed to RUN another program upon booting; this is done with most commercial software. For your own programming disk, it is often useful to have your HELLO program designed to run Program Line Editor (or some other major utility), so that you can edit your programs immediately, rather than having to load your utility programs first. An example of a HELLO program that does this is shown below:

```
5 D$ = CHR$(4)
10 PRINT "MASTER SYSTEM DISKETTE 64K
   SYSTEM"
20 PRINT "7 NOV., 1983WORKING DISKETTE"
30 PRINT D$; "RUN PLE"
40 END
```

**HEX$** An Apple III Business BASIC function. HEX$ returns the four-character hexadecimal value of the arithmetic expression included in the parentheses which immediately follows the function instruction. For example:

```
PRINT HEX$(1000)will return 03E8.
PRINT HEX$(-1000) will return FC18.
```

Hexadecimal Referring to the numbering system which uses 16 as its base. The symbols for the sixteen distinct values are 0 through 9 and A through F. To distinguish between 13 (base 10), and 13 (base 16) which is equal to 19 (base 10), hexadecimal numbers are preceeded by a dollar sign ($). The equivalent values for the three common systems, decimal, binary, and hexadecimal are below.

DECIMAL	BINARY	HEXADECIMAL
0	0000 0000	00
1	0000 0001	01
2	0000 0010	02
3	0000 0011	03
4	0000 0100	04
5	0000 0101	05
6	0000 0110	06
7	0000 0111	07
8	0000 1000	08
9	0000 1001	09
10	0000 1010	0A
11	0000 1011	0B
12	0000 1100	0C
13	0000 1101	0D
14	0000 1110	0E
15	0000 1111	0F
16	0001 0000	10
17	0001 0001	11
18	0001 0010	12
19	0001 0011	13
20	0001 0100	14
21	0001 0101	15
22	0001 0110	16
23	0001 0111	17
24	0001 1000	18
25	0001 1001	19
26	0001 1010	1A
27	0001 1011	1B
28	0001 1100	1C
29	0001 1101	1D
30	0001 1110	1E
31	0001 1111	1F
32	0010 0000	20

Hexadecimal Arithmetic When in the system monitor (* prompt) you may perform one-byte hexadecimal arithmetic as follows (<RETURN> means press the RETURN key):

```
* 21 + 15  <RETURN>
= 36
* 4B -D  <RETURN>
= 3E
```

```
* FF + 6  <RETURN>
= 05
* 1B -1C  <RETURN>
= FF
```

Hexadecimal Op Codes Each of the command mnemonics in Assembly language has a hexadecimal code called an operation (op) code. These codes differ depending upon the mode of operation. They are listed below according to the operation. If the mnemonic is not listed under a mode, it is not used in that addressing mode.

Immediate Mode

ADC	69	AND	29
CMP	C9	CPX	ED
CPY	C0	EOR	49
LDA	A9	LDX	A2
LDY	A0	ORA	09
SBC	E9		

Zero Page

ADC	65	AND	25
ASL	06	BIT	24
CMP	C5	CPX	E4
CPY	C4	DEC	C6
EOR	45	INC	E6
LDA	A5	LDX	A6
LDY	A4	LSR	46
ORA	05	ROL	26
ROR	66	SBC	E5
STA	95	STX	86
STY	B4		

Zero Page.X

ADC	75	AND	35
ASL	16	CMP	D5
DEC	D6	EOR	55
INC	F6	LDA	B5
LDY	B4	LSR	56
ORA	15	ROL	36
ROR	76	SBC	F5
STA	95	STY	94

Zero Page.Y

LDX	B6	STX	96

Absolute

ADC	6D	AND	2D
ASL	0E	CMP	CD
CPX	EC	CPY	CC
DEC	CE	EOR	4D
INC	EE	JMP	4C
JSR	20	LDA	AD
LDX	AE	LDY	AC
LSR	4E	ORA	0D
ROL	2E	ROR	6E
SBC	ED	STA	8D
STX	8E	STY	8C

Absolute.X

ADC	7D	AND	3D
ASL	1E	CMP	DD
DEC	DE	EOR	5D
INC	FE	LDA	8D
LDY	BC	LSR	5E
ORA	1D	ROL	3E
ROR	7E	SBC	FD
STA	9D	STY	8C

Absolute.Y

ADC	79	AND	39
CMP	D9	EOR	59
LDA	B9	LDX	BE
ORA	19	SBC	F9
STA	99		

(Indirect.X)

ADC	61	AND	21
CMP	C1	EOR	41
LDA	A1	ORA	01
SBC	E1	STA	81

(Indirect).Y

ADC	71	AND	31
CMP	D1	EOR	51
LDA	B1	ORA	11
SBC	F1	STA	91

Hexadecimal-to-Decimal Conversion See Hex$.

HGR An Applesoft BASIC statement that accesses the computer's hi-res graphics display. It causes the computer to display twenty lines of computer's hi-res graphics display. It causes the computer to display twenty lines of hi-res graphics and four lines of text. The text is displayed at the bottom of the screen. This command sets the background color of the screen to black. No display will show on the screen unless the HCOLOR command has been used to cause the plot to be displayed in a color other than black. The above information applies to the Apple II, II+, and IIe.

Hi-Fi Adaptor* An easily-mounted device that allows you to run computer-generated sounds and game sounds through your stereo for added fidelity and more excitement. Circuitry protects the computer from the external amplifier. Device can be switched between Apple speaker and stereo. Happ Electronics, Inc.

Higher Fonts I* Features twenty-five hi-res graphic shape sets. Choose from an assortment of letter/symbol styles. 32K. Synergistic Software.

Higher Graphics II* Design and edit characters for business, education, or fun. Details and coloring are hi-res. 48K. Synergistic Software.

Higher Text* A Machine language program that can be used with BASIC to create text on a hi-res graphics screen. Features upper and lower case 96-character ASCII character set, printing capabilities of various sizes and colors, an editor for character modification, and complete documentation. 32K. Synergistic Software.

Higher Text II* A maximum of ten character sets will provide documentation for graphic displays. Ten colors are available for an added attraction. 32K. Synergistic Software.

High-Level Languages These languages, which include BASIC, COBOL, FORTRAN, Pascal, FORTH, C Programming Language, LOGO, and others, are designed to make the entering of program information easier on the programmer. In each case, the entries must either be compiled or interpreted before the 6502 can process the commands in its native binary code.

High-Speed Repeat The Apple III and Apple IIe computers are equipped with a repeat key and high speed repeat key feature. The repeat key feature is accessed by holding down any key for more than half a second. This action causes the computer to repeat the character at a speed of eleven characters per second on the screen. The high-speed repeat feature of the Apple III can be used by pressing the Closed Apple key along with the key of the character to be repeated. This generates a repetition of thirty-three characters per second. On the Apple IIe, if a key is held down for more than one second, the character associated with the key is repeated. This feature of the Apple IIe is called automatic repeat.

High-Speed Terminal Program* Turns your Apple II into a high-speed 80 by 24 computer terminal, enabling it to work asynchronously at up to 4800 baud. A 256-character FIFO buffer and upper and lower case support from the keyboard are featured. Program source code for user customization is included in the manual. Bit 3 Computer Corp.

HIMEM BASIC Statement. Sets the address of the highest location available for use in an Applesoft program, including storage of string variables and program line. This protects Machine language routines from being written over by very large Applesoft programs. The address is not reset by any of the ordinary BASIC commands, including CLEAR, RUN, NEW, or DEL. The format is

```
HIMEM:<address>
```

where the maximum value for the address is 49152 ($C000) for a 48K system or 65536 ($10000) for a 64K system.

Hipad Digitizer, The* Converts graphic information into digital values and acts as a menu. The operator can use either a stylus or a cursor to input isometric drawings, X-rays, business graphics, or architectural drawings into the computer. You also get English or metric scaling, data format, and selectable baud rates. Houston Instrument.

Hi-Plot Interface To Apple Plot* Can accomodate up to six sets of data for bar charts. Allows for lettering and plotting data on the Houston Instrument Hi-Plot plotter. Computer Stations, Inc.

Hi-Res Editor* Create and edit geometric shapes. Figures are saved for instant recall. 16K. W Helm.

Hi-Res Electronic Design* Circuit plans can be designed and drawn on the screen. As many as ninety-eight different components can be displayed and rotated for better understanding. Control of your creations is manipulated with paddles or joysticks. Requires 48K for the Apple II and Apple IIe. Avant-Garde Creations.

Hi-Res Mastertype* An instructive program for touch-typing in the format of a space war game. To stop enemy missiles, satellites, and atomic fireball attacks, you must correctly type in special words. There are seventeen challenging lessons. 48K. Lighting Software.

Hi-Res Secrets* A color palette program that lets you to choose from hundreds of colors to fill in shapes created by this package. Design hundreds of shapes such as vector shapes, data array shapes. Shape examining, shape editing, shape drawing, and violin sounds are created. Featured are: two-page flipping animation, shift (ROR and ROL) animation, and two-page H-Plot or block-shape animation. Avant-Garde Creations.

Hi-Res Versatile Calculator* A program that displays a typical calculator on the computer's screen and then allows you to use it to solve problems, convert values, display the contents of the computer's stack, and otherwise, to fulfill the requirements of a calculator. The calculator which is presented onscreen uses Reverse Polish Notation in carrying out mathematical processes. The program requires an Apple II or Apple II+ with a minimum of 48K of RAM, Applesoft in ROM, one DOS 3.3 disk drive, and a monitor. Some fifty calculator functions are available with the results of using these functions displayed onscreen. This program could best be used to teach mathematics, use of the stack, and use of Reverse Polish Notation. The manual included with the program is excellent in its explanation of program operations. Tackaberry Software.

Histo-Graph* Tracks four different fields of data with a calendar-based histogram or bar graph production system. Works with sales figures, biological data, or laboratory readings. Hayden Book Company.

History and Geography Package* A series of drill and practice lessons on regions of the U.S., states and capitols, presidents, countries and continents, and the Revolutionary War. Micro Learningware.

HLIN BASIC Statement. HLIN is used to draw horizontal lines in the low-resolution graphics mode, in the color most recently specified. The format is

```
HLIN 15, 30 AT 20
```

which will draw a horizontal line from column 15 to column 30, across the middle of the graphics screen (row 20).

Hodge Podge* Consists of cartoons, songs, and animations, that will familiarize children, from one to six years old, with numbers, musical notes, animals, and more. Artworx.

Hog Farrowing Projection* Designed for feeder pig operations, this program calculates break-even purchase prices for sows, feeder pigs, and the break-even number for weaning. It also figures the profit per pig, per litter, and per sow. H.C.I.

Hold Screen Display See INPUT Statement and Pause.

Holding Register A register that holds data temporarily to bridge a speed or timing gap between two devices.

Hollerith Code Herman Hollerith was employed by the U.S. Census Department about a century ago. In 1887, he devised a code for punched cards which is still in use today whenever punched cards are used for recording information. Each card has twelve rows and eighty columns. The first three rows indicate which third of the alphabet is being referred to; the remaining nine rows indicate a particular letter. For example, a punch in row 1 and row 6 would indicate the letter "C"; in row 2 and row 6, it indicates the letter "L." Numbers are indicated by using only one hole per column, starting with row 3 (for zero) through row 12 (for 9).

HOME A command in Integer, Applesoft, and Apple III Business BASIC which instructs the computer to return the cursor to the upper left corner of the screen (home) and to clear the screen. This command may be used as an immediate command or a deferred command.

Home Accountant, The* A personal financial planning program that handles everything from budgets to checkbooks. It is possible to list all transactions within a particular category and allow for up to 1,000 transactions per disk. Includes hi-res graphics and can plot up to three categories on the same line. 48K. Continental Software.

Home Cursor Code The Apple III console driver recognizes a number of screen control codes which are included in program lines as ASCII codes between 0 and 31. When the computer comes to one of these codes in a program line, it executes the action associated with the code. The screen control code for HOME is (12). Thus, if a program line read as follows:

```
PRINT CHR$(12)
```

the console driver would return the cursor to the upper left corner of the viewport, but would not clear the screen.

Home Finance Pak I* A four-program package to help home users keep an accurate and current record of their savings and spendings. A budget is created for twenty catagories which may be sorted and compared. Checkbooks and credit cards are updated with each transaction and service charge. Spectrum Software.

Home Finance Program* A home budgeting program that has 175 entries with twelve categories for each year, month-to-date and year-to-date summaries, can classify tax-deductible expenses, and balance your checkbook. Digital Marketing.

Home Health Disk* An almost complete home health guide, operated from a series of menus. The two disks are not an interactive program but rather a large database. Information on the first disk is divided into four categories: emergencies, injuries, general categories, and health habits. On the second disk is information about specific problems from acne to diaper rash, high blood pressure to warts!

Information has been gathered from many texts which are respected in their respective areas. In addition, there are references to quality medical journals, such as American Family Physician. The directions for use are very clear. The replacement policy includes a free disk (in exchange for a faulty one) for the first month, and a backup of the two program disks for $10 with proof-of-purchase. Brahman Software.

Home Inventory File* A program that handles the information for a number of different purchases. Fields include ID number, manufacturer, date of purchase, quantity, and description. Westware Software, Inc.

Home Money Minder* Monthly transaction records will help keep you within your budget plan. Expenditures are compared monthly and yearly. 48K; printer. Continental Software.

Home Safe Home* A program that points out safety problems in your home and includes suggestions for preventing accidents. 48K. MCE, Inc.

Home TV—Hooking Up RF Modulator See Radio Frequency Modulator and Sup'R Mod*.

Home-I* A three-part analysis program:1) mortgage analysis, which figures simple and monthly mortgage payments, monthly mortgage tabulations, and pay-off time for your mortgage; 2) compares renting as opposed to buying; and 3) figures out rough home values based on home design information. 48K. MPA Enterprises.

HomeTemp—A VisiCalc* Template* A variety of useful programs: one monitors car or fuel costs; there's a general purpose tax deduction recording template with a Schedule A (Form 1040); and the retail store comparator helps you compare prices at three stores. With the "Home Temp," you can figure out your family inflation index. Exec Systems.

Honesty Test* See how honest you really are with this package. It doesn't pull any punches, so crossing your fingers won't help a bit! Paul's Electric Computer.

Honor Roll Sort* A program to compile lists of Honor Roll students throughout the academic year, including their grade-point averages. Depot.

Horizontal Position Code One of the thirty-two screen control codes recognized by the Apple III console driver is the horizontal position code. This code is an ASCII 24 enclosed in parentheses in a program line. When this code is encountered, the computer moves the cursor to the horizontal position specified in the argument contained in the program line.

Horizontal Shift Code The horizontal shift code is one of the thirty-two screen control codes recognized by the Apple III console driver. This code must be enclosed in parentheses after a CHR$ expression, and must be associated with an argument which defines the number of columns text is to be shifted to the right or left in the viewport. If the number is positive, text is shifted to the right. If it is negative, text is shifted to the left. All spaces from which text has been shifted are changed to blanks. When the command is given, if the relative distance of the shift from the cursor's location is greater than or equal to the viewport width, the viewport is cleared.

Horoscope in Mundo* Develops an astrological chart including projected planetary positions in a list form with the aspectarian references. AGS Software.

House Comparison With Relocation* Makes a list of cusps in seven house systems and instantly relocates cusps for any location. AGS Software.

Housekeeping Refers to the operation of the computer in removing unused string variables to make space for other program lines and string variables. Appears to "hang up" the operation of a program, but after the housekeeping pause the program will proceed.

How to Operate the Apple IIe* A tape recorded tutorial for beginning users of the Apple IIe computer, presented on three cassettes for the standard cassette player. It helps to have a counter on the cassette player, but it is not absolutely necessary. The tutorial comes with a very brief manual; the user is introduced to the features of the keyboard, use of the 80-column card, use of all special function keys, and related basic tasks. It takes the time to explain the various means of switching back and forth from the 80-column display on the Apple IIe. It goes on to deal with printing data on a printer, the use of a numeric keypad which may be attached to the computer, arithmetic operations and precedence, using menus, switching languages, copying files and disks with FILEM and FID, using wildcard characters in copy operations, and much more useful material for the beginning user of the Apple IIe. The approach used in this particular tutorial is refreshing, in that it is designed to acquaint the beginning user with his machine and to help him overcome any fear of opening things up to install a new peripheral or just to have a look at what makes it all work. Fliptrack Learning Systems.

How to Operate the Apple II+* A system for individual education that provides you with three audio cassettes containing complete instructions for showing you how to operate the Apple II+

computer system. You may listen straight through on one side of the cassette tape, performing the various functions as directed, or you may use the unique format which gives additional instructions on selected topics by flipping the tape over, setting your counter to zero, and listening to this reverse side for a while. Rewind to zero, re-flip the tape, and you are right where you left off on the main side. The narrator's voice is pleasant in both tone quality and pace, providing you with personalized instruction, rather than merely reading a tutorial manual. FlipTrack Learning Systems.

How to Use VisiCalc* A program containing four audio cassettes, which lead you through the functions of VisiCalc* up to and including Boolean logic, DIF files, documenting a model, and designing a template. The discussion is generic, so you will need to have your VisiCalc* Manual for reference concerning those functions which differ according to machine. It takes about thirty to forty minutes for one cassette, assuming that you do not stop it at any time or flip it over for extra instruction; therefore, you should probably allow about one and a half hours per lesson. The flip-side contains quizzes which you may take either before or after each lesson. Even someone who has used VisiCalc* can find out some new twists by listening to these lessons. FlipTrack Learning Systems.

How to Use WordStar & MailMerge* An instructional package which trains the novice in the use of this powerful word processing and integrated mailing list software. The package includes four audio cassettes and a User's Guide. You must have access to a computer which is capable of using WordStar*, a copy of WordStar with MailMerge*, and a cassette tape player (preferably with a built-in counter). The materials contained in this particular instructional program are excellent. They take the user through the important features of WordStar from booting the program, through the meaning and use of WordStar's menus, to the use of each WordStar command. The method used in this educational package is a combination of tape recorded lessons with a brief manual and hands-on experience using the program with the computer. The package is very thorough; it not only introduces the user to WordStar and MailMerge, but allows the serious user to master the programs completely. Certainly a worthwhile way to learn! FlipTrack Learning Systems.

How to Write an Apple Program* Written by Ed Faulk. If you were expecting this book to teach you Applesoft BASIC, try again. On the other hand, if you want a book which discusses program design, soruces of program ideas, coding and debugging for maximum usefulness, then this is it. All of the sections are illustrated by a Checkbook program which is developed from beginning to end. The book contains amusing cartoons, light-hearted and easy-to-understand writing, and a bibliography of additional resouces. If you are in a hurry for a checkbook program, the entire code is listed in an appendix. Datamost, Inc., Reston Publishing Co.

HPOS The Horizontal POSition of the cursor on the screen can be controlled in Apple III Business BASIC from within a program for the purpose of formatting output, or for locating the cursor to receive input by using the HPOS command. If the computer encounters the following expression in a program:

```
HPOS = 2: PRINT "STOP HERE"
```

it prints the words "STOP HERE" in the twelfth horizontal position of the line where the cursor is located when the command is encountered. The horizontal position of the cursor may be determined in this language by entering:

```
PRINT HPOS
```

HP7470 PLOTTER DEMO* This package consists of nine demonstration programs for use with an HP7470 or HP7225 plotter. Particular needs and data can be served by modifying the programs. Programs included are: Birthday Plot, which draws beautiful spiral plots from random points, showing the power of the plotter; 12-Month Trend, which plots a 12-month moving average for two sets of data; Phone Chart, which plots a ledger sheet for entering names, addresses, and phone numbers; Display Slides, which creates posters or presentation slides; and digitizer software. Ensign Software.

Human Body: an Overview, The* An educational program for users age eleven and older that teaches the systems of the body using animated graphics and text descriptions. Includes eight lessons. Disk or cassette. Brainbank, Inc.

Human Engineering Friendly programs for the operator (user). If you write programs that others will ever use, you should never forget to give clear prompts for every item of input data, to freeze the screen long enough for them to read or act on the information displayed, to provide clear error messages if anything is entered incorrectly or error situations arise, etc. This is often referred to as "human engineering" because it makes the program easy to use, as well as technically correct. Another term for this side of programming is making the program user friendly.

several guidelines exist for writing user friendly programs. If a complex series of data items has been typed in and some entries turn out to be invalid, the user should be able to reenter the bad items without redoing everything. Error messages should indicate not only that an entry is invalid, but also how it is invalid and, if possible, hints on correcting it.

Human Skeleton, The* Teaches the skeletal system, including joints, cartilage, ligaments, and major bones. Brainbank, Inc.

Hurricane Tracker, The* The user enters a storm's coordinates (as reported by the National Weather Service), and the program plots its location on a Gulf Coast map. The program calculates the path the storm is following, its strength, average rate of movement since the last report, and the distance of the storm from area cities. More than one hurricane may be tracked at once, and the program contains historic data on previous storms for comparitive use. Climate Assessment Technology, Inc.

Hurricane Tracking Program* For the weather conscious among us to keep track of current hurricane and tropical storm activity. By inputting the reported positions and other statistics, the program computes and displays the storm's intensity and speed of movement. The path is also shown on a map of the southern US and Caribbean Sea. Climate Assessment Technology, Inc.

HX-12* A high-resolution RGB color monitor designed with an NEC .31 mm dot pitch CRT to provide up to 690 dots horizontal resolution. The PGS HX-12 delivers sixteen supercolors, 80 characters by 25 lines. Princeton Graphics.

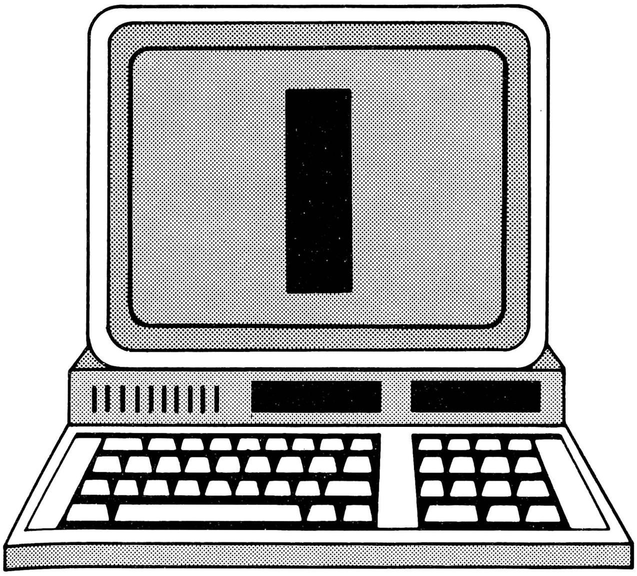
Hygrometer Program* Similar to the dual thermometer program, this program is designed to turn the dual thermometer into a dual hygrometer. Determines humidity, dew point, and temperature using wet and dry probe temperatures. Operational range is from -67 to 212 degrees Farenheit, and 0 to 100 ½ relative humidity. Strawberry Tree Computers.

Hypak Heat Exchanger Analysis* Separate program modules may be configured and assembled to simulate heat exchangers of the gas-to-gas and gas-to-liquid varieties. Will predict exit conditions given inflow data. Includes thirteen modules. Physical Science, Inc.

Hypersort* Add this Machine language sorting routine to your program. Just CALL and this routine sorts arrays; it even has a reverse sort option. Instructions take you step-by-step through a demonstration of all the available features. An extra bonus allows you to sort a file without opening a scratch file. Morningstar.

Hyper-Typer* A program which teaches the user to type and increases the user's typing speed. The program is available for the Apple IIe. It uses the 80-column card. The documentation which accompanies the program contains instructions on booting the program, a keyboard diagram, and explanations of each drill. Excellent drills are provided for beginning and experienced typists and computer keyboard users. Summit Software Corporation.

.HEX A file extension used in CP/M to identify a file produced by an Assembler. These files (programs) can be converted to .COM files by using the LOAD command. The files are, in effect, Machine language files for CP/M.



I Codes. ASCII = 73, HEX = 49. i—ASCII = 105, HEX = 69.

[I] A parameter used in PIP operations in CP/M. It must be enclosed in brackets immediately following the file name designated in the PIP command line. This parameter instructs PIP to ignore any ".00" records in a .HEX file which is being transferred or copied by PIP.

I Key ESC-I. Used in editing. See Moving the Cursor.

I Speak BASIC: A Computer Literacy Package* By Aubrey B. Jones, Jr. A class course in BASIC programming that will take students all the way from an introduction to microcomputers to an understanding of BASIC and computer programming. Topics in BASIC range from simple commands to array and subroutine processing. The set contains quizzes to chart the progress of student learning. Hayden Book Company

I Speak BASIC to My Apple* By Aubrey B. Jones, Jr. This book comes with a companion Teacher's Manual and is designed to introduce students to programming in BASIC on the Apple II/Apple II+. The photographs (two) are of an Apple II+, but the material is applicable to the Apple IIe (although there are no references to the special keys found only on the IIe). The Teacher's Manual is the student text with overprint comments to the instructor, and an additional fourteen pages at the end contain answers to the practice problems and quizzes. The quizzes come separately as a set of fourteen Spirit Duplication Masters, twelve lesson quizzes, and two review quizzes.

The material covered is much the same as any introductory BASIC programming text, but there are several improvements. For example, the program used to demonstrate a FOR...NEXT loop includes a STOP command, so that the value of the loop counter can be checked before the next cycle. The material covers one-dimensional arrays and subroutines, and includes low-resolution graphics. Sixth grade reading level. Hayden Book Company.

IBR (Incorporate By Reference)* Lets you enter blocks of text into a library file. As you create the document, type the reference, and the program will add the proper block at the correct location. Requires 48K RAM; CP/M 2.2; and a text editor. Digital Marketing.

IC Integrated Circuit (q.v.).

Ican* A stress-management program designed for adults and young adults. 32K. Micro Power & Light Company.

I-Ching* Look into the future with the well-known ancient Chinese fortune-telling program: *The Book of Changes*. Each reading comes with an explanation of hexagrams and trigrams. This program features excellent graphics. Paul's Electric Computer.

I-Ching (An Astrology Program)* This popular program figures out hexagrams from the I-Ching. Using random-number generation with a seed moment that the user provides, the program sends out hexagrams that are displayed on the screen. Changing lines and upper and lower trigram names are given, when appropriate. 8K. Matrix Software.

ICOP* An instructional course in Common PILOT for the Apple. It is possible to learn all the basics of this easy-to-use programming language in about two hours. Micropi.

IDGame* An exercise in strategies for identifying organic compounds. This game is based on forty-one test results for thirty-three organic compounds. Student progress can be audited by the teacher. 48K; DOS 3.2 or DOS 3.3. Conduit.

ID12 Printer Interface* See CE12 Printer Interface*.

IF BASIC Statement. IF statement makes a decision regarding program flow based on the result of an expression. The formats are:

```
IF <expression> THEN <clause>
IF <expression> [THEN] GOTO <linum>
IF <expression> THEN GOSUB <linum>
```

<expression> may be any numeric expression.
<clause> may be a BASIC statement, a sequence of

statements separated by colons, or the number of a line to branch to.

<linum> is the line number of a line that exists in the program.

Notice that in the second format, the word THEN is optional, but in the first and third formats it is not; leaving out the word THEN will result in a ?SYNTAX ERROR IN <linum> message being displayed.

If the value of <expression> is one (true), the THEN, GOTO, or THEN GOSUB clause is executed. THEN may be followed by a line number for branching or one or more statements to be executed. GOTO and GOSUB are always followed by line numbers.

If the value of <expression> is zero (false), the THEN, GOTO, or THEN GOSUB clause is ignored. Execution continues with the next executable statement in Integer BASIC. In Applesoft, if <expression> evaluates as false, execution jumps to the next numbered program line and all statements following the THEN are ignored.

When you enter an IF...THEN statement in direct mode, and it directs control to a line number not previously defined, you will receive only the prompt (]) and the flashing cursor; in other words, nothing will happen, but you will still be able to enter program line numbers as if the memory were clear of all but previously entered program material.

When using IF to test equality for a value that is the result of a computation, remember that the internal representation of the value may not be exact. Numbers are stored internally in floating point binary format, so the test should be against the range over which the accuracy of the value may vary.

IF...THEN statements may be nested. You are restricted only by the length of the line entered (239 characters).

IF...GOTO IF...GOTO is an Apple III Business BASIC instruction which causes the program operation to move from the line on which this command is found, to the program line designated in the instruction. The nature of the instruction dictates that some condition must be met prior to going to the designated line. Otherwise, the program line following the line on which the instruction is encountered is executed. An example of this instruction is:

```
2000 IF X = 12 GOTO 2500
```

IF...THEN IF...THEN is an Apple III Business BASIC instruction which works in a fashion similar to the IF...GOTO instruction discussed earlier. It may also be a part of the IF...GOTO instruction. For example:

```
2000 If X = 12 GOTO 2500
```

is treated the same way by the program in its execution as

```
2000 IF X = 12 THEN 2500
```

or

```
2000 IF X = 12 THEN GOTO 2500
```

IFO-Data Base Managemer Program* Create and manipulate data in your own database. Any file can be sorted (ascending or descending order) on any field, for editing, inputting, or printing. Files can also be cross-referenced, and mathematical operations can be performed. Three versions have been developed and labeled: I, II, III. Requires 48K and Applesoft; Version II requires two disk drives; Version III requires Corvus. Software Technology for Computers.

Illustrator, The* Uses joysticks to create and color a variety of geometric figures. Text may be entered for documentation. Also features an enlargement option for detailed work. 48K. Island Graphics, Inc.

IMAGE An Apple III Business BASIC statement which is used to format the output of numbers on the screen or in print. Each program line which contains an IMAGE statement also should contain the specs which are associated with expressions in PRINT USING statements. An example of the use of both of these expressions follows:

```
)110 IMAGE +####.####,3“.”
)120 PRINT USING 110;12999,1299.9,129.99,
   12.999,1.2999,.12999
)RUN
```

If this program is typed in as shown and RUN as indicated, the output will be as follows:

```
)!!!!!!!!!...+1299.9000...+ 129.9900...+ 12.9990
1.3000...+ 0.1300...
```

The exclamation points indicate that the number of characters to the left of the decimal point exceeds the number of characters called for by the number of “#” symbols to the left of the decimal point in the IMAGE statement. The number of periods displayed after each number is controlled by the numeral which follows the comma and precedes the “.” in the IMAGE statement. The number of characters which follow the decimals in the output coincides with the number of “#” symbols to the right of the decimal in the IMAGE statement.

Image Printer* Produces dumps for graphics programs. You can print all of a screen or only a portion of it. It is menu-driven which allows shapes to be printed in any of six sizes. 48K; printer. Sensible Software.

Image Printer—NEC* Increase the size of images by three-fold. Features the ability to print characters horizontally or vertically. 48K; dot matrix printer. Sensible Software.

Immediate Execution See Execution, Immediate.

Immediate Response to One-Character Answers See GET.

Improving Your Memory* A memory-development program. Provides interactive experiences by using a few specific methods. Mesa Research.

IMREAD The RS-232 Driver on the SOS Utilities diskette for the Apple III computer uses software switches to control the handling of buffer activity when the computer is communicating with another computer or a serial device. The driver handles read operations as directed by the software switch settings. If the switch called IMREAD is called by the user and control code 1 is set (equal to $80), the driver reads the contents of the buffer and does not delay further execution of the program even if there is a character count given in previous instructions. If control code 1 is clear (equal to $00), the driver delays further execution of the program until the correct number of characters is loaded into the buffer.

IN# BASIC Command. Specifies the slot (from 1 to 7) which will provide subsequent input for the program. IN#0 returns to the keyboard as the source of input.

inCider* Apple computer magazine. *inCider* includes departments on Applesoft tutorials, software and book reviews, hints and techniques, the Apple III, and articles of all types—from reviews to humor to discussions of where Apple is headed from here. *inCider* is a monthly publication. See Magazines for subscription rates and information.

Incomplete Records Accounting System* Handle your office accounting and financial control needs with this package that provides such features as trial balance and income statements, audit trail, comparative data, verification of input, and more. 48K; two disk drives; and printer (up to 80-column). Padmede Computer Services.

Incredible Jack A multiple applications program available for the Apple II, Apple II+, and Apple IIe. The program includes a word processor, a database manager, a spreadsheet, and a mailing list. It provides the capabilities described for a reasonable price and is a useful program for almost everyone. (The professional user would probably require more sophisticated software.) 64K; two disk drives. Business Solutions.

Incrementing in Loops The first loop variable is incremented and compared to the second loop variable only at the bottom of the FOR...NEXT loop. Therefore, the portion of the program inside the loop will be executed at least once. When a loop is completed, the value of the loop variable will be one more, or STEP(n) more, than the second or maximum loop variable. See FOR...NEXT for compete discussion.

INDENT Apple III Business BASIC allows you to control how far a FOR...NEXT loop will be indented from the left edge of the screen or printed display. These loops are indented two spaces by default unless an INDENT statement is used. The syntax for an INDENT statement is:

```
INDENT = <number of spaces to indent>
```

This command can be a direct command which precedes a LIST command. It may also be used in a program line.

Index Diskette Directory. See VTOC.

Indexed Files* Set up an ISAM-DS on your personal computer. Will easily retrieve files by name, key value, or partial key value. It's faster than other systems. Sequential retrieval can also be done. 32K ROM or 48K RAM. Decision Systems.

Indexed Sequential Access Method A program or package that supports files organized with one or more indexes. Records may be retrieved from the file, either sequentially or randomly, by the key used in the index.

Individual Tax Plan* Gain a full range of tax advice by varying the input values to your advantage. All major calculations are performed in seconds. You can vary any part to see its reaction toward the end result. Long-range tax goals, deductions, shelters, etc., can be incorporated for future planning. Updates of the program are developed to reflect changing tax structures. Aardvark Software.

Individual U.S. Income Tax Package* Lets the Apple assist you in preparing your tax return. All the tables are stored, as well as the form layouts. Investments can be checked for their impact on your tax situation. A variety of calculations can be performed, including: tax liability, medical and prescription expenses, funds withheld for F.I.C.A., and self-employment tax. The results of these calculations can even be printed directly on the standard tax forms. Pansophics, Ltd.

Individualized Planning System* Can produce up to eight user-defined reports and organize up to 400 pages of information on individuals. Includes a graphic User's Reference Guide. 64K. Learning Tools.

INFOTORY* An inventory control program written for use on the Apple II+ computer with 48K of RAM and Applesoft in ROM. It requires two disk drives operated by DOS 3.3, a monitor, and a printer capable of printing a document 80-columns wide.

INFOTORY is a complete inventory management system that can handle up to 1400 items through the entire sales process from acquisition to ultimate sale. The program uses an inventory management system which is built on a base of the following elements: part number, description, selling price, p/o (reorder) level, location, vendor, quantity on hand, average unit cost (done by the computer), and extended unit cost (done by the computer). Once the base inventory has been established, items on order may be entered along with their purchase order number, delivery date, quantity, and extended cost.

Inquiries may be made from the Main Menu about any item in the inventory; inquiries may operate screen displays or printouts. Inventory reports, price lists, and sales/cost analysis reports are available as preformatted reports. The documentation is well done. It contains descriptions of the required computer system; descriptions of the inventory system used by the program; and illustrations of all the input screens, output screens, and output reports used by the program. An excellent program for anyone seeking an inventory management program. S.S.R. Corp.

Infotutor* A ten disk tutorial on the computer and its social impact. Through interaction with the computer, the user learns history, logic, concepts of storage and applications, and specifics on mainframes, minis, and micros. 64K. Frank Salvage.

Infoworld* Computer-oriented newspaper. *Infoworld* is a weekly newspaper about microcomputers. It is valuable for keeping up with new developments on a week-by-week basis. Most computer stores and larger bookstores carry *Infoworld. Infoworld*'s address is:

InfoWorld
Circulation Dept.
Box 837
Framingham, MA 91701

INITGRAFIX The use of Apple III Business Graphics must be initiated by first opening the .GRAFIX Driver, then by INVOKEing BGRAF.INV, resetting four of the default conditions for the operation of the .GRAFIX Driver with INITGRAFIX, setting colors for the current pen color and for the background, and, finally, setting the viewport dimensions. INITGRAFIX is accessed by typing:

```
PERFORM INITGRAFIX
```

It sets the viewport to the full screen, places the cursor in the lower left corner of the screen, sets the color table to normal, and sets the transfer option to normal.

Initial Program Load (IPL) See Boot and Reboot DOS.

Initialize a Diskette Before a diskette may be used to store data (files, programs, etc.), it must be initialized or formatted for system housekeeping. The disk is divided into thirty-five concentric tracks numbered from zero to thirty-four (zero being the outermost track). The disk arm (and therefore the read-write head) can be positioned at any of seventy phases, thus allowing a half-track to be read if it is so recorded. Attempts to use adjacent half-tracks, however, will result in electronic crosstalk and loss of data because the resolution of the read-write head and the accuracy of the stepper motor are not sufficient.

A sector is a subdivision of a track and is the smallest unit of data which may be changed on the diskette. Current Apple DOS divides each track into sixteen sectors. DOS locates these by finding a series of "self-sync" bytes or hexadecimal FFs. These self-sync bytes occur at the beginning of each sector as well as between fields of information (address and data fields). To initialize a diskette, place a blank diskette in the active disk drive (you must have booted a valid diskette previously) and enter:

```
INIT HELLO
```

The drive will make some ratcheting noises and then some soft swishes for about thirty seconds, at which time the drive light goes out and your diskette is initialized. While convention uses the name HELLO for your initialization program, you may use any valid file name. This is the program which will be run whenever you boot the disk and load DOS into memory.

Innovative Program Associates* Designers of a series of tutorials for various aspects of the computer. Each subject is covered in its own individual package. Requirements are 48K of RAM and DOS 3.3. The titles include: Introduction to the Computer, Statistics, Computer Simulation, The Uses of Database, The Computer as a Calculator, The Printer, Business Applications, Computer Graphics, and Business Forecasting. Innovative Program Associates.

INPUT BASIC Statement. INPUT statement receives input from the keyboard during program execution. The format is:

```
INPUT ["<prompt>";]
<variable> [,<variable>...]
```

"<prompt>" is a string constant which is optional and may be used to prompt for the desired input.

<variable> is the name of the numeric or string variable or array element which will receive the input.

When the program encounters an INPUT statement, it pauses and displays a question mark (?) on the screen to indicate that data is to be typed in. When a <prompt> is included, this string is displayed and only the flashing cursor appears. The data that is entered is stored in the variable or variables declared in the variable list. When there is more than one data item, each must be typed in and separated by commas. The number of data items must match the number of variables in the list. The type of each data item that you enter must also agree with the type specified by the variable name (string or numeric). Strings entered in response to an INPUT statement don't need to be surrounded by quotation marks unless they contain commas or significant leading or trailing blanks.

If you respond to INPUT with too few items, the screen will display a double question mark (??) indicating more INPUT is needed. If you respond with too many items, the screen will display ?EXTRA IGNORED and continue with the program. If a single numerical INPUT is requested and you press RETURN without entering a value, a ?REENTER message will be displayed and a ? will be on the next line waiting for input. On the other hand, if the INPUT is expecting a string (INPUT A$ instead of INPUT A), then RETURN is a valid entry, which places "" (null string) in A$. No input values will be assigned to any variables until an acceptable response is given.

INPUT READ data into memory. Memory is any device which can store information and allow it to be retrieved when needed. Data in internal memory is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT). See External Memory, Internal Memory, and Memory.

INPUT# The INPUT# command in Apple III Business BASIC is used to instruct the computer to input data from one of ten open files into the program as variable data and to execute the activity required by the program steps dealing with this data. As many as ten files can be open at any given time in Apple III Business BASIC. File handling activity is directed to each of these files as needed by using the "#" symbol followed by the file number and the file name. An example of this command is:

```
)1200 OPEN #2, Wages
)1210 OPEN #4, Employees
)1220 INPUT #4, Employees$
)1230 INPUT #2; Wages
```

INPUT Statement, Dummy To freeze the screen until the operator is done with it, put in a dummy input statement and instruct the operator to press <RETURN> to proceed. The input variable need not be used in your program.

```
1000 INPUT "PRESS <RETURN>
   TO CONTINUE";A$
```

It is standard practice to place this prompt on the bottom line of the screen by using a VTAB 24 command prior to the INPUT statement, unless screen display prohibits this placement.

Input/Output See Input; see Output.

Insects* An introduction to the world of insects which includes a comprehension testing game to reinforce important concepts taught in the tutorial portion of the program. Disk or cassette. Right On Programs.

Insert Characters Placing characters between those already on a line. For example, placing an omitted letter in a word or an omitted word in a line. See Edit Mode.

Insert Line To place a line between two existing lines in a program (or in internal memory). Standard practice uses line numbers in increments of ten; if you need intermediary lines in your program logic you may insert them using line numbers between the two tens, in increments as small as one. Because you will usually find it necessary to insert lines before finishing your program, it is not a good idea to start numbering your program lines in increments smaller than ten.

Insoft Accountant, The* For small-to medium-sized businesses and CPAs. It contains four programs: General Ledger, Accounts Receivable, Accounts Payable, and Payroll. CP/M. Insoft, Inc.

Inspector, The* A utility that can search and edit RAM and read or modify disk data. It is a ROM package and attaches in the D-8 socket of integer boards or ROM cards. Therefore, it is not necessary to load a program to access this utility. Some of its many uses are: memory search (disk sector reading, repair, rewriting, editing), group sector loading into memory, disassembling, modifying, and rewriting to disk. It is a command-driven package (twenty-two commands). 48K; language card. Omega Microware, Inc.

Instant Recall* This database system requires you to initialize the data diskette from within the operating program, and not just use an ordinary DOS-initialized diskette. The text entry mode is free-form, allowing you to place information anywhere on the screen. You are, however, limited to one 40-column screen of information per record. A total of 28672 characters may be stored in one file, and four files may be stored on one data diskette. With two disk drives, you may have simultaneous access to as many as eight files; maximum loading time for a file is five seconds. When you save a file to disk, you will have a three-line summary description. This is a very handy feature, in case you use the file infrequently and you can't remember exactly what is on it.

The manual is nicely designed, and the binder is the type which will stand up in easel format. A list of all commands is available on the screen from the main menu and may be printed. You may also abort printing at any time by pressing any key, assuming you do not have a printer buffer (see MicroFazer*). Error handling is extensive, ensuring that you do not spend several hours entering data, only to lose it.

The system has some drawbacks: it does not provide a backup disk, there are no directions for making your own backup, and there is no provision for purchasing a replacement disk at reduced cost. Searching can be done on any two words with a logical-AND search (logical-OR searches are not supported); the search is sequential, but very fast. Howard W. Sams & Co., Inc.

Instant Zoo* A series of four fast games and a word list editor. In Instant Zoo, the computer creates a picture of your favorite zoo animal. You must guess what the picture is with the fewest clues possible. Scramble asks you to choose words from a jumbled mass of letters that are racing to the bottom of the screen. In Quick Match, you must choose matching pairs of words from the screen. Star Watch tests your ability to spot falling stars. Recommended for ages seven to ten. 48K. Apple Computer, Inc.

INSTR An Apple III Business BASIC instruction that normally is used in the immediate execution mode and returns the position of a specified substring within a given string. The syntax for this instruction is:

```
PRINT INSTR "<string>", "<substring>"
```

Instructions A statement that causes a computer to carry out a specific action. Commands differ from instructions in several ways. A command is usually a complete specification of an action, while instructions usually must be combined (in dozens or hundreds) to make a useful program. Commands are usually acted upon immediately by the computer, while instructions are saved for later execution in a program. Commands are acted on by the basic operating system of the computer, while instructions must first be processed by a particular program such as the BASIC interpreter, a FORTRAN or PASCAL compiler, etc. See Disk Operating System.

Insurance Broking System* A comprehensive insurance management package that will help any insurance broker manage his client base. You can maintain up to 999 Client Ledger Credit Accounts with a total of 3300 postings. The Insurer Ledger can maintain 99 Credit Accounts with 3300 total postings. File updates occur monthly from the Monthly Files. Reports include: Renewals List, Alphabetic Client List, Accounts Payable and Receivable, Remittance Advice Notices, Statements of Accounts, etc. 48K. Padmede Computer Services.

INT BASIC Function. INT function returns the largest integer that is less than or equal to (<x>). The format is:

```
<variable> = INT(<x>)
```

<x> is any numeric expression.

For example:

```
PRINT INT(57.97) returns 57.
PRINT INT(-4.53) returns -5.
```

See Rounding.

INT Systems Command. Typing INT when using Applesoft (] prompt) will make Integer BASIC the active language. You need to have Integer BASIC resident in the language card/16K RAM card by loading it from the System Master diskette. This will occur automatically if you boot the computer using the System Master diskette.

.INT .INT is a CP/M file extension used to indicate that a file is an intermediate compiled BASIC program.

Integer—Convert to, by Rounding BASIC. See Rounding.

Integer BASIC vs. Applesoft BASIC The Apple II has Integer BASIC as its firmware language; Apple II+ and Apple IIe have Applesoft resident in ROM. Commands available in Applesoft, which are not available in Integer BASIC are:

ATN
CHR$
COS
DATA
DEF FN
DRAW
EXP
FLASH
FN
FRE
GET
HCOLOR
HGR
HGR2
HIMEM:
HOME
HPILOT
INT
INVERSE
LEFT$
LOG
LOMEM:
MID$
NORMAL
ON...GOSUB
ON...GOTO
ONERR GOTO
POS
READ
RECALL
RESTORE
RIGHT$
ROT
SCALE
SHLOAD
SIN
SPC
SPEED
SQR
STOP
STORE
STR$
TAN
USER
VAL
WAIT
XDRAW

These commands, available in Integer BASIC, are not available in Applesoft:

AUTO DSP MAN MOD

These commands, available in both languages, are named differently:

Applesoft BASIC	Integer BASIC
CLEAR	CLR
CONT	CON
HTAB (N.B. Applesoft also has TAB)	TAB
ON X GOTO 1000, 2000, 3000	GOTO X*1000 + 1000
ON X GOSUB 100, 110, 120	GOSUB X*100 + 100
HOME (or CALL-936)	CALL-936
INVERSE	POKE 50, 127
NORMAL	POKE 50, 255
X% (indicates Integer variable)	X
≠ or >< (not equal)	#

In Integer BASIC, the syntax of a statement is checked as the statement is stored in the computer memory, when you press RETURN. In Applesoft, syntax checking is not done until the statement is executed (when the program is RUN).

In Applesoft BASIC, only the first two characters of a variable name are significant; in Integer BASIC all characters are significant.

Both strings and arrays must be DIMensioned (q.v.) in Integer BASIC. In Applesoft, it is necessary to DIMension only arrays (one-dimensional arrays with more than eleven elements, and all multidimensional arrays). In Integer BASIC, arrays are limited to one dimension. Applesoft sets all array elements to zero on execution, RUN, or CLEAR; in Integer BASIC, the program must set all array elements to zero using a FOR...NEXT loop.

END (q.v.) is an optional statement in Applesoft, but is required in Integer BASIC to avoid an error message.

Integer Boards The Apple Integer BASIC ROM card (for the IIe) is a plug-in firmware card with a switch-controlled ROM version of Integer BASIC. It also contains certain Assembly language programs which are not included on the Applesoft ROM. Integer BASIC may also be loaded onto a language card or memory expansion card, as DOS is loaded into the system.

Integer Fix, The* A utility that helps change programs written in Integer BASIC so they are compatible with an Apple II+. This Apple runs only Applesoft BASIC and the conversion will open its programming horizons. Barrington Educational Computer.

Integer Variable Integer (or numeric) variables for whole numbers from -32767 to +32767 end in %. Integer numeric variable must start with a letter, can have up to 100 characters, and must not contain any reserved words, such as IF, ON, THEN, GOTO, etc., or any type declaration words such as $. See BASIC—Variable Names.

Integers/Equations* Calculate integers in any of the four basic arithmetic functions. Contains twenty problems per lesson and twelve lessons per disk. 48K. Hartley Courseware, Inc.

Integrated Circuit A complete electronic circuit with multiple components (transistors, diodes, resistors, capacitors, etc.) all constructed on a single small silicon chip.

Integrity of Data Insuring that data (or programs) cannot be altered improperly. For example, in a payroll system, steps must be taken to insure that employees cannot improperly alter their pay rates or work hours. Data security consists of guaranteeing both data integrity and data privacy.

Integrity Plus* Keep track of possible weaknesses in your system with this complete hardware checking utility. A diagnosis report is given for all major parts including memory chips, disks (speed, head movement, read/write), a configuration check is done of all parts, printer cards, and more. The program can run automatically or manually, and comes with a complete Manual for diagnosis and troubleshooting. Applesoft and DOS 3.3. Solidus International Corp.

Intelligent Card Reader (Model 1100-A)* The user can program this unit for the selection of a variety of operational parameters such as parity, baud rate, data conversion, status, and character length. This model will read punched cards, pencil marks, and partially marked zones at a rate of 120 cards per minute. Other features include selectable baud rate, ability to read cards in a variety of formats, and the ability to convert Hollerith data into ASCII, Binary, Numeric, or hexadecimal. Mountain Computer, Inc.

Intelligent Investor Series 1* Keep track of all your investments and how they are doing over a specified period of time. Data on many types of accounts can be input, updated, closed, and analyzed. Record cash additions/withdrawals, dividends and interest, investments, brokerage commissions, quarterly portfolio valuations and more. 48K; Applesoft; 16-sector, dual disk drives. The Intelligent Investor.

Intelligent Keypunch* A sophisticated product that offers these capabilities: data can be entered any time, off-line, by an untrained operator; data can be stored so it can be transmitted at a later time to a remote computer; data can also be received from a remote computer and stored. Initial installation will probably require help from a professional. Serendipity Systems, Inc.

Interest and Loans, Investments and Record of Investments* A group of financial routines to compute loan amortization and payment schedules, time value of money, interest calculations, annuities, and more. DOS 3.2 or DOS 3.3. Computer House Div./FLC, Inc.

Interest Print* Allows the user to calculate interest due and bill it to customer accounts. Andent.

Interface The point at which two systems make contact. Most microcomputers have multiple interfaces, or ports, such as a serial port to connect serial devices, a parallel port, TV or monitor ports, a power port, and joystick ports. Interface is also used to refer to the type of interconnection, with respect to its size or shape (subminiature 25-pin D connector), its mode of function (serial, parallel, etc.), or its electrical characteristics (RS-232C, etc.).

Intermediate Applesoft BASIC* A continuation of the Beginning Applesoft BASIC course, using four instructional units to teach remaining BASIC commands and concepts. Topics range from system commands to looping and functions. Ties Minnesota School District.

Intermediate Multiplication and Division* Perfect your computing ability using one of these two functions. Has twenty-one different levels of difficulty. 48K. The Computer Connection, Ltd.

Internal Memory Memory is any device which can store information and allow it to be retrieved when needed. The Apple relies primarily on random access memory (RAM), read-only memory (ROM), diskettes, cassettes, and hard disks. Memory, by itself, is usually a reference to RAM. This is the general purpose, erasable, and reusable memory located inside the computer.

ROM (Read-Only Memory) contains fixed data, usually programs such as those required to operate the System Monitor (q.v.), the cursor control, etc. ROM and RAM together make up the internal memory or main memory of the Apple, or any other computer.

Compare this to external memory—such as cassette, diskette, and hard disk—which involves mechanical motion to retrieve data and is thus hundreds or thousands of times slower than internal memory. Data in internal memory is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT).

If data has been created, it can be written out to external memory without a READ first. And, if data read in from external memory has not been modified, there is no need to write it back out since the original copy is still there.

While external memory is very slow relative to internal memory, it also has advantages. It is much cheaper per character of data stored on-line (available for processing without manual intervention). In addition, the ability to store external memory data off-line (such as diskettes or cassettes in a box) allows essentially unlimited storage of data. This, of course, requires a manual step of inserting the diskette/cassette/disk before the data can be loaded into the internal memory for processing. See Bank Switching; Bubble Memory; Diskette Formats; Memory; Addresses; Map, Memory; Memory Segments; RAM Disk; RAM Memory Cards; Spool; Virtual Memory.

Interpreter Any programs that run directly on the Apple are Machine language programs, in the actual numeric instruction code of the Apple 6502 microcomputer chip. Most were orginally written by a programmer as text files known as source programs. The source program contains relatively readable statements in a language such as FORTRAN, COBOL, or BASIC. These are then translated by a compiler program, producing an object program.

The object program contains the Machine language instructions for the Apple 6502 which correspond to the instructions of the original source program.

Regular BASIC is a program (in Machine language) which uses your BASIC program as a guide to what it should do. It is therefore an interpreter, processing each line of your source program and interpreting what should be done. Since it must reinterpret your source program each time you run it, interpreted BASIC can be as much as 100 times slower than compiled BASIC.

When you write a BASIC program, you have produced a source program in text form. The BASIC interpreter, itself a Machine language program, uses your source program as data—a source of instructions or commands to control its execution.

Suppose you decide to speed up a BASIC source program by compiling it into a faster Machine language program. You will need a BASIC compiler, a program not supplied with the Apple, but available from various software houses. You run your BASIC compiler, giving it the source program that you wrote as input. The BASIC compiler will translate your program into Machine Code.

Interrupt A signal to an MPU that an event has occurred which requires attention. The MPU will save enough information to resume the task it is currently working on, then execute code from an interrupt-servicing program. There may be multiple interrupt lines or other ways of distinguishing interrupts, in which case the MPU can tell from which interrupt signal it receives what type of event has occurred (vectored interrupts). The Z-80 provides eight types of interrupts. Interrupts provide a much more efficient way of managing external events (such as a keypress at a keyboard) than continually checking to see if any event has occurred (polling).

Interrupting Execution of Program Use of the STOP command in a program causes the program to cease execution, with a "BREAK IN LINE NUMBER" message printed, and control returned to the user. Use of CTRL-C command during the execution of a program has the effect of inserting a STOP command immediately after the statement currently being executed. In either case, use of CONT will cause the program to resume at the next executable statement, not the next line number. All variables and program pointers remain as they were just before CTRL-C was executed. Use of RESET or CTRL-RESET however, will cause some pointers and stacks to be cleared, so the use of CON (Integer) or CONT(Applesoft) may not cause proper execution of the Program.

Interval DrillMaster* Gives the student practice in identifying and noting simple melodic intervals. There are twenty-two levels of training, and the package comes with evaluation facilities so that the student can analyze his own progress. 48K. Conduit.

Interval Mania* For practice of harmonic and melodic intervals with combinations of interval sizes and qualities (major, minor, augmented, diminished, and perfect) and practice in bass or treble clefs, or full great staff. 48K. Micro Music, Inc.

Introduction to Applesoft BASIC* A series of tutorials that provide an elementary presentation of Applesoft BASIC. The lessons are not tied to any specific book and consequently are useful for review, as well as introductory classes. 32K. Minnesota Educational Computing Consortium.

Introduction to Computers* Teaches students in grades seven and above about computers. Topics range from an introduction to computers and programming to the social and economic impact of the machines. The set includes four film strips with accompanying audio cassettes and two programmed disks full of "hands-on" computing lessons. 32K. Society for Visual Education, Inc.

Introduction to Lo-Res Graphics* A book and disk package that explains lo-res graphics. Scelbi Publications. Computer Stations, Inc.

Introduction to Microcomputers* Designed for grades three to six, this introductory course uses the computer to teach students about computing. The computer is represented as a personality that students can relate to and have fun with while learning. Package includes a teacher's resource guide. 32K; 3.3 DOS. Computer Learning Connection.

Introduction to Microcomputers* Teaches elementary to junior high school level students the basics of the microcomputer. The six programs will teach the keyboard, computer terms, and the components of a computer system. Mentor Software, Inc.

Introduction to Organic Chemistry* A supplement to a beginning course in organic chemistry. A collection of seven disks covering nomenclature and simple reactions: 1) Alkanes and Alkenes, 2) Substitution Reactions, 3) IR and NMR Spectroscopy, 4) Arenes, 5) Alcohols, 6) Aldehydes and Ketones, and 7) Carboxylic Acids. 48K. COM Press.

Introduction to Weather Charts* Extensive graphic displays demonstrate weather chart features such as air masses and pressure zones. Uses synoptic charts. 48K. Avant-Garde Creations.

Introstat 2.2* This statistics package includes in its subtitle the phrase, "for the Behavioral Sciences," but it can be used in other areas as well. The program is menu-driven. The main program functions by constructing a data file which is manipulated to other programs on the diskette. The file is not a closed one; you may either delete or append additional cases, up to the maximum size of the files.

You may perform statistical tests such as descriptive statistics (minimum, maximum, mean, median, standard deviation, standard error, and frequency table), two-way cross tabulation, t-test, Mann-Whitney U test, Wilcoxon matched-pairs signed-ranks text, and one-and two-way anova. The documentation explains briefly what each test does and cites the standard statistics textbooks. Ideal Systems.

Intro/X-10* This system gives you control of your household lights and appliances. Uses the BSR System X-10 and comes with complete software. Mountain Computer, Inc.

Invader Attack* Your starship is damaged, and it's up to you to define the problem and calculate the resulting mathematical equations for repairs. The enemy is still attacking, so problems constantly arise. Provides a fun way to practice addition and subtraction of fractions. 48K. Zeitgeist.

Invader Round Up* A space game that offers drill and practice in mathematics. The galaxy has been invaded by aliens; to find these aliens, the student must figure the basic location (called warp) and three adjustments (bias). If successful, the aliens are captured, one by one. The goal is to capture all the invaders. 48K. Zeitgeist.

Inventario1 Whole Numbers* A diagnostic and prescriptive program that points out and corrects weak areas in one of thirty-two math skill levels. Titles, instructions and comments in this program are set in Spanish. Since English usage is not important, math skills (of Spanish speaking students) can be assessed without distortion due to English reading problems. Sample record sheets can be duplicated by the teacher and the student can keep a record of dates and scores for completed exercises. Record sheets, to be used by the student, are in Spanish. Grade levels five through nine. 32K; Applesoft. NTS Software.

Inventario2 Fractions* For grade levels five through nine. 32K; Applesoft. NTS Software.

Inventario3 Decimals* For grade levels five through nine. 32K; Applesoft. NTS Software

Inventory* A package that categorizes items by number, name, category, quantity, price, and/or three descriptions. Search is possible by category, number, name, or three descriptions. You can print one or all of the items with extended prices and total inventory value. The routines to enter, delete, or show any item are easy to use. Storage is available for 3500 items using the 8050 drive, and 1150 using the 4040 drive. Computer House Div./FLC, Inc.

Inventory* Take charge of your inventory system with this program. It generates detailed, comprehensive reports providing data for each item with regard to pricing, ordering, availability, and more. Included are detail reports, status reports, transaction reports, and inventory worksheets. This system can handle more than one price per item and will automatically flag items that need reordering. Peachtree Software.

Inventory Control* This package offers an inventory ledger for each item that includes pricing, number of items produced (year-to-date), and number of items sold (year-to-date). It has room for 250 items. Golway Computer Enterprises.

Inventory Control* A program with six capabilities: 1) initializes, adds to, and updates master and transaction records; 2) lists transactions and master files; 3) supplies stock analysis reports and ABC analyses; 4) calculates economic order quantity; 5) displays allocation of material-used-to-date by job control classification codes; and 6) receives, issues, and runs transactions and creates inventory records. Compumax.

Inventory Management System for Stock Control* A helpful, user friendly system that gives tight control over your inventory. Features: database in Machine language for fast retrieval; ability to store

4800 items; storage of sixteen descriptions for each item, including part number, location, units, unit cost, list price and so forth; user-defined backorder tracking; ability to print worksheets or checklists for physical inventory. 48K. Hayden Book Company.

Inventory Manager, The* This total inventory package offers these services: computes profit margins, maintains statistics, generates reports, lists vendors, and calculates inventory, reorder points, back orders, master order status. Will update and maintain markup, wholesale, and retail prices. Handling capacity is 2300 items and ninety-nine vendors. 48K. Synergistic Software.

Inventory Pac* CMA's strong disk inventory program and inventory management library. Keeps track of 250 items on disk and supplies management tools for ordering and purchase timing. It has all the features of the two CMA programs. 32K. Charles Mann and Associates.

Inventory Pac* Keeps track of your store's inventory. One special feature tallies how much stock remains from various vendors; another helps make decisions about how much to buy of what items. Creative Discount Software.

Inventory Program* A two-disk, menu-driven program. Includes description, vendor ID, class, location, reorder point, reorder quantity, order date, selling price, quantity on hand, and stock number. Items can be entered, deleted, updated, and changed. Reports are sorted in ascending/descending order by user-defined category. Computes inventory value month-to-date, year-to-date. A 132-column printer is required. Software Technology for Computers.

Inventory Software Packages Within this encyclopedia are a number of inventory packages. These packages help the storekeeper or businessman keep accurate and current records of stock, thereby lowering business costs. In general, these packages list items by a number of different categories, such as: part number, part description, vendor code, unit cost, quantity on order, unit of measure, unit selling price, quantity on hand, manufacturing part number, date of last issue, minimum quantity, and inventory turnover. They also have the capacity to add, delete, or change inventory items; produce inventory reports; figure out dollar value of inventory; and list the number of items purchased (year-to-date), and the number of items sold (year-to-date). Flexible management reports, reorder reports, period-to-date reports, departmental summary reports, and inventory price lists are usually included and many can be sorted in ascending/descending order. As previously mentioned, this is a rather general description of the following software packages; each program may have its own special features:

Program Name	Vendor
Barcode Print and Read Software	Advanced Business Technology, Inc.
Barcode Symbol Reading Software	Advanced Business Technology, Inc.
Cashier, The	Apple Computer, Inc.
Complete Inventory Control Systems	Advanced Business Technology, Inc.
Economic Order Quantity (EOQ)	Execuware
Film Booking	Unicom Division of United Camera, Inc.
Forecaster-Buy	Alessi Data Technology
Inventory Control	Facts Management Systems, Inc.
Inventory Control—MultiStore	Facts Management Systems, Inc.
Inventory Control System	BPI Systems
Inventory Control System	Softech
Inventory Control System W/MRP	C.F. Kerchner & Associates, Inc.
Inventory Management	Peachtree Software, Inc.
Inventory Manger, The	Synergistic Software
Inventory Program	Software Technology for Computers
Job Cost System	Scripps Data Systems, Inc.
Job Costing System	Padmede Computer Services
Logmars Interactive Print/Verify	Advanced Business Technology

Microinv	Compumax
Micro-Inventory	Serendipity Systems, Inc.
Order Scheduler, The	High Technology, Inc.
Purchase Order Tracking	Facts Management Systems, Inc.
Purchasing Aides Pak 01	C.F. Kerchner & Associates, Inc.
Quikdirt—In-Process Inventory	Wyman Associates
Quikdirt—Warehouse Location	Wyman Associates
Stock Control System	Padmede Computer Services
Stockfile (Multi-User)	Solidus International Corp.
Stockfile	Solidus International Corp.
Stockmaker	Solidus International Corp.
Stockroom	Monument Computer Service
Stockseller	Solidus International Corporation
Store Manager, The	High Technology, Inc.
Systems II Ex-Inventory	Westware Software, Inc.
Total Inventory	TCS Software
Total Materials	TCS Software

INVERSE BASIC Command. This command causes the screen display to appear as black characters on a white background. This mode remains in effect until the command NORMAL is issued, returning the display to white characters on a black background.

INVERSE Code The Apple III Console Driver uses thirty-two screen control codes to specify the parameters for screen display. If the user wishes all characters printed on the screen to be dark characters on a light background (inverse), the INVERSE screen control code must be toggled on with an ASCII 18; it should be toggled off with the same code.

Investment and Mortgage Management* A program to assist the investor or small business manager in making financial decisions. Make amortization schedules, time value of money calculations, and more. 8K; cassette or disk. Technical Software.

Investment Data System* Helps the investor gather information on stocks and commodities. A time series data system that is recommended for the advanced programmer. 32K; graphics tablet. Urban Aggregates, Inc.

Invoice Data System* Uses reports or graphics to display statements or invoices. Product descriptions may be included on the report. 48K. Micro Lab.

Invoicing System* Value Added Tax (V.A.T.) is calculated automatically after obtaining any of the ten rates from a product file. A maximum of 1,250 products may be recorded on the product file, with seventeen products per disk. These are used to create summary reports, invoices, product details, daybook listings, or credit notes. 48K; printer. Padmede Computer Services.

Invokable Module A Machine language routine available in Apple III Business BASIC. These modules are identified in a file directory by the .INV suffix. Fastprint is an example of such a module.

INVOKE INVOKE is an Apple III Business BASIC command which loads a Machine language subroutine. These subroutines are executed by using the PERFORM command in a program line.

I/O Input/Output. See Input; see Output.

I/O Port See Games Controls.

IR Instruction Register. In most MPUs, the IR contains the address of the next instruction to be executed. Branches are implemented by loading a new value into the IR.

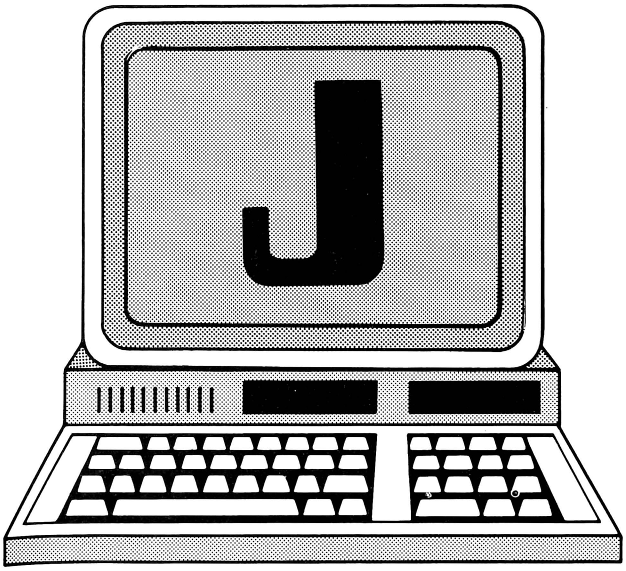
IRA Assessor, The* Designed to assist CPAs, attorneys, and tax accountants in demonstrating the benefits of individual retirement accounts to clients. 32K; DOS 3.3. ABT Microcomputer Software.

IS Pipeline* A random access printing buffer that allows you to store data that's being directed to a printer and to communicate this data directly to the printer. You can also choose to hold the data temporarily and then direct it to the printer in a particular sequence which might include word processor files, graphics displays, and spreadsheet files. This buffer may be used with any parallel interface card connecting the computer to a printer. The Pipeline may be purchased with 8K to 128K of buffer memory. With a buffer of sufficient size between the computer and the printer, data is captured by the buffer at the same rate as the computer communicates and is relayed to the printer at its printing speed. Consequently, the computer finishes the data transmission quickly and may be used for other things.

The Pipeline is a distinctive buffer since it allows the user much more flexibility than the normal buffer. It offers you three options. The first option is FIFO (First-In-First-Out), the manner in which all conventional buffers operate. It also offers a bypass option that is useful if an extremely long printing job must be delayed while a short printing job is executed. To interrupt a long job that is already stored in the buffer and being printed, just set the switch to BYPASS and press an INTERRUPT button while the printing is going on. This stops the buffer from printing, holds the unprinted data in the buffer's memory, and allows the user to print any number of other documents at the printer's normal speed. When this direct printing has been completed, the user returns the switch from BYPASS to NORMAL. The third option is Random Access Printing. This feature allows the user to store a number of documents in the buffer prior to printing any document. The stored documents may consist of program listings, word processor files, text files, business graphs, graphics displays, and spreadsheets. These files may then be printed in the order dictated by the user. Random Access Printing is accomplished by setting the switch previously set to FIFO to RAP, the BYPASS/NORMAL switch to NORMAL, and then pressing the INTERRUPT and ERASE buttons at the same time. Once the buffer has been set in this fashion, the user saves the data to be printed in up to sixty-three "buckets" (memory locations within the buffer's memory). This printing buffer is an extremely versatile tool for the microcomputer user. The installation instructions and the Operations Manual are quite complete and are easy to follow. Interactive Structures, Inc.

ISAM Indexed Sequential Access Method (q.v.).

ISAM-DS* With the help of fifteen utility routines, a full range of data storage, manipulation, and printing can be achieved. The program sets up the data retrieval in the form of ISAM files, which is quite useful. This allows you to get files through key values, partial key values, or sequentially, if you wish. Full editing and printing capacity. 3K. Decision Systems.



J Codes. ASCII = 74, HEX = 4A. j—ASCII = 106, HEX = 6A.

J Key Used in editing. See Moving the Cursor.

Jewish I.Q. Baseball* As you answer questions, run the bases to score a point. Compete against the computer, a friend, or another team. Each game consists of 200 questions covering topics of prayers, festivals, Jewish history, or Israeli history. 48K. Institute for Computers in Jewish Life.

Jewish I.Q. Baseball—Teachers' Version* Identical to Jewish I.Q. Baseball except that the teacher chooses the questions and the values for each correct answer (i.e. home run, base hit, etc.). 48K; disk. Institute For Computers Jewish Life.

JMP Assembly language mnemonic for "JuMP;" equivalent to GOTO in BASIC.

Job Control System* Keeps close control over what goes on in your business. Profit/loss potential is monitored as each job progresses. Efficiency is improved, job estimations are more accurate, potential problems are noticed earlier, and customer satisfaction is improved. This program will indicate excessive costs, time spent, and problem areas for you in plain English so that you will be able to run your business at maximum profitability. No computer knowledge is necessary, and the accompanying manual comes with illustrations and examples for use. A trial run is available for the user to become familiar with the system. High Technology, Inc.

Job Cost Accounting* A system that can handle many different accounting activities. Features a payroll system, posts costs to the general ledger, and maintains process charges and income for all work. 48K; Applesoft; and a 130-column printer. Charles Mann & Associates.

Job Costing System* Job costing for the print industry can be done accurately and efficiently with this system; the system allows you to cost by operation at a specific rate and keep track of up to ninety-nine operators and forty-six operations. Information is easily accessible and detailed reports can be generated. 48K; printer. Padmede Computer Services.

Job Estimating & Cost* Create the files and records for job cost estimating. The program is flexible to accomodate many job/projects or just a few. Lists of materials and totals can be printed. Other business applications such as payroll, accounts payable/receivable, and general ledger are included. Computer House Div./FLC, Inc.

Job Readiness—Assessment and Development* A program that will help prepare you for the real world. It helps the student develop job preparedness and provides practical knowledge, such as how to fill out a job application form and locate employment agencies. 48K. MCE, Inc.

Job Readiness Attitude Assessment* Looks at prevocational attitudes and indicates what the consequences of those attitudesmight be on-the-job. After you work with the computer, your attitudes are assessed a second time. The computer then evaluates your attitudinal changes and prints out the results. MCE, Inc.

Job/Cost Accounting* See KBS Job/Cost Accounting*.

Joystick BASIC Coordinates. The joystick replaces two paddles attached to the game I/O port (q.v.); hence it will have two sets of coordinates, horizontal movement and vertical movement. To determine the current value of the coordinates, you need to use the following statement:

```
<X> = PEEK (PDL<n>)
```

where <n> is either 0 or 1. Which paddle designator is horizontal and which is vertical will depend upon the trim settings of your joystick. The statement will return a value between 0 and 255. See PDL.

Joystick* A high-quality self-centering unit made from custom-designed components to be entirely linear over the available input range. The Joystick has two large buttons and exclusive trim to match the unit to the Apple. TG Products.

Joystick* This joystick has an agreeable size box, which fits in the hand without causing strain, and the buttons are placed so as to be easily operated with the left thumb and forefinger while the right hand operates the stick. This would not be a convenient joystick for someone who is unreservedly left-handed. There are trim tabs for both the X and Y axes, and the self-centering feature can be turned off for either or both of the axes with switches on the bottom on the box. Kraft Systems Inc.

Joystick Button BASIC. See PDL.

Joysticks, Game The following is a list of some of the major joysticks on the market:
AZD Joystick (2001), AZD Company; CJM Microstick, CJM Industries; Joystick, Datamost; Joystick, Gesu Ent.; Kraft Joystick KJS-OIA, Kraft Systems Company; Mimco Stick, Mimco; Robo Stick, Astar International.

Juego De Suerte* Spanish version of "pig," this program is a fun encounter with chance and probability. 32K; Applesoft. NTS Software.

Juegos Ortographicos* Two programs in one package: one permits the teacher to build data files with spelling lists; the second reads the files and uses them in a variety of exercises. The user may: 1) list all words, 2) flash words, 3) guess missing letter, 4) construct patterns, 5) play hangman, and 6) end the program. For grade levels two through five. 32K; Applesoft. NTS Software.

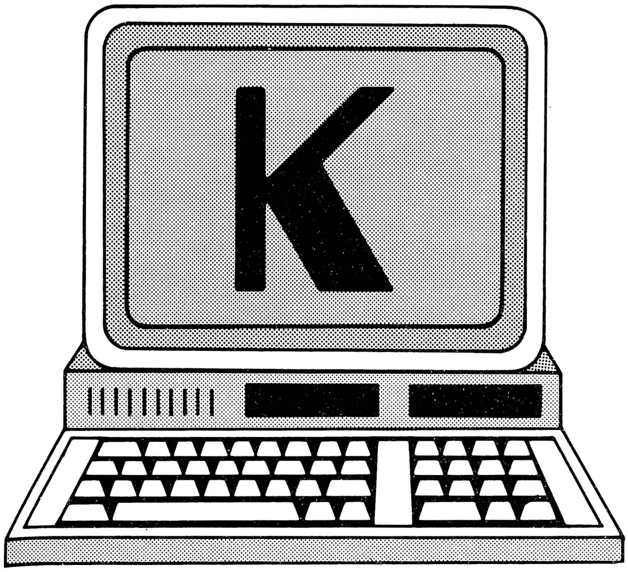
Juggles's Rainbow* Allows very young children to use the computer keyboard even before they have mastered reading skills. Juggles's Rainbow has cyclical rainbow colors and Juggles's Butterfly shows a butterfly changing colors. An award-winning program. The Learning Company.

Juke Box* This synthesizer (which plugs into your Apple) can be used in a variety of musical applications. You may insert up to six music boards, each board creating as many as three simultaneous voices. Use the speaker inside your Apple or connect eight ohm speakers externally. 48K; Applesoft or Apple II+. American Micro Products, Inc.

Junior High Math Disk* Offers the following fifteen programs: Magic Squares; Multiplication; Division; Modular Arithmetic; Proportion Problems; Percent Problems; Addition of Fractions; Subtraction of Fractions; Multiplication of Fractions; Division of Fractions; Mode, Median and Mean; Bar Graph Analysis; Decimals I; Decimals II; and Verbal Problems I. Microphys Programs.

Junior High Package* Includes Function Grapher, Solving Linear Equations, Solving Simultaneous Linear Systems, Arithmetic Racing, Binomial Multiplication, and Orbiting and Rotating Figures. Math Software.

Justify To make the edges of a text file line up straight. Left justification is almost universal in English text. Right justification is usually present only in text that has been typeset or processed by a word processor or special typewriter to insert a variable amount of space between words or letters (proportional spacing). This book is printed with justified left and right margins.



K Codes. ASCI = 75, HEX = 4B. k—ASCII = 107, HEX = 6B.

K Measurement of bytes. Byte is a label for storage to hold one character (letter, digit, etc.) in computer memory, internal or external. Byte is abbreviated B, or in thousands KB, or simply K. Actually, 1K = 1024 because this number is an even power of 2. Apple often has 64K (or 64KB) of internal memory, or 64,000 bytes (to be precise, 64K = 64 x 1024 = 65,536 bytes).

K Key Used in editing. See Moving the Cursor.

Karel the Robot* A programming/debugging environment for Pascal and your Apple II. Your programming skills develop as you learn to control Karel through mazes and races. The course disk is a step-by-step program that teaches you the skills to master this unique version of Pascal. Cybertronics International, Inc.

KB Measurement of bytes in thousands. See K.

KBD An Apple III Business BASIC command which instructs the computer to look for any key press from the keyboard and return the ASCII value of the key pressed. This command can be used in the fashion shown in the following example:

```
100 ON KBD GOTO 200
110 FOR X = 1 TO 100 STEP 1
120 PRINT "********"
130 NEXT X
200 PRINT KBD
220 ON KBD GOTO 200
```

This program prints a continuous string of eight asterisks for 100 cycles. Each time a key on the keyboard is pressed, the ASCII value of that key is printed on the screen, and the program stops.

KBS Job/Cost Accounting* An accounting program that is easy to use as it is self-prompting and menu-driven. It is meant to be used by any professional who charges clients for time spent on the job (hourly, daily, etc.). The user can enter information about completed jobs, clients served, and so forth. It automatically posts data to a journal and to a general ledger, and it can generate profit/loss statements and income statements. Kleinhammer Business Software.

Kernal, SOS See SOS Kernal.

Key Signature Drills* A series of programs, including a game, for recognition and identification of major and minor key signatures. 48K. Micro Music, Inc.

Keyboard Special locations. The following two memory locations are often used in determining the value of the last key pressed (see GET) and clearing this information awaiting the next key:

Description	Location Hex	Decimal
Keyboard Data	$C000	49152-16384
Clear Keyboard Stobe	$C010	49168-16368

A PEEK to location 49152 will return the ASCII value of the last key pressed; a POKE—6368,0 will clear the keyboard strobe.

Keyboard* This program uses the graphic capacity of the Apple to help the unskilled typist memorize key placements and learn finger movement for each keystroke. A keyboard is drawn on your computer screen and when you press a key, its matching letter is animated on the screen. The words you construct are then displayed on the lower screen. This system will help you break the habit of glancing at the keyboard and also will build confidence and speed. An excellent system, all around. It's a program that will enchant children as well as build up their confidence. Softart Software.

Keyboard—Echo Function Echo means to send characters keyed on the keyboard to the screen for a visual confirmation of what has been typed. There is no hardwired connection between the keyboard and the screen. The keyboard simply enters characters into memory and the ROM programs of Apple then copy the characters from memory to the screen, creating a duplication, or "echo," of what was keyed.

Keyboard—Read Characters BASIC. See GET.

Keyboard—Read Data from BASIC Program See INPUT.

Keyboard Enhancers See Keypads-Add On and Keytronic*.

Keyboard Macros Functions called by a single key press. Some programs, such as Global Program Line Editor* by Neil Kozen, contain a provision for defining certain keys or combinations as macros. In that program for example, the macros defined include ESC-1 for CATALOG, D1; ESC-0 for HOME; ESC-L for LIST, etc. You may define other key combinations to mean any twenty-character statement: when you press the defined key, the particular function is printed as if it were entered from the keyboard.

Keyboard & Display Enhancer* An add-on device that will add many new features to your Apple. Primarily, it adds lower case letters to your character set which are compatible with most word processors. Upper case letters are accessed by the SHIFT or CTRL key. To return to the normal upper case set for BASIC, just put the enhancer into alpha lock. Videx, Inc.

Keyboarding* A typing program that helps you master the keyboard. Twenty lessons offer you a systematic approach to improving your skills. The computer makes note of your errors; there are review lessons after each lesson. As an added plus, exercises contain microcomputer terminology to enhance computer knowledge. The user must successfully complete one level before moving on to the next. Educational Activities, Inc.

Keypads—Add-On Keypads designed to be added to the Apple so that you can add on keys. In some instances, the keypad is designed to add a numeric keypad with arithmetic function keys to give your Apple a calculator keypad. Other keypads can be programmed by the user to add symbols that are not normally included on the Apple keyboard. The keypad usually is interfaced through the game port. Contact the vendors of these devices for more specific information regarding the features of each keypad.

PRODUCT NAME	VENDOR
ABT Softkey	Advanced Business Technology
Data Entry Pad For Apple II	Advanced Business Technology
Numeric Keypad	The Keyboard Company
Softkey Utility Keyboard, The	Advanced Business Technology

Keytronic* A plug-in detached keyboard designed to be an IBM look-alike, but tailored for the Apple. Some of the characters have been rearranged on the keyboard to conform more to a typewriter-style layout. Added keys include left and right square brackets, TAB, another CTRL key, a ten-key number matrix, and some special function keys.

Function keys give single-stroke access to commands such as HOME, LOAD, RUN, SAVE, DELETE, LIST, PR#6(return) and CATALOG. In addition, single keys can invoke CTRL-C, CTRL-X, ESC-E and CTRL-. These keys are labeled STOP, DEL LINE, CLR EOL and BREAK respectively.

All character keys are capable of auto-repeat which can be toggled on and off, and the keyboard is capable of outputting lower case letters. The keys are extremely sensitive and responsive—an advantage for the fast typist.

Installation involves partial disassembly of the Apple. There is some discrepancy between the connector described in the instructions and the one attached to the end of the keyboard cable. The normal conventions used to identify the orientation of pin and socket are overlooked or ignored.

Once installed, software may need to be reconfigured if lower case output is enabled—a procedure which involves partial disassembly of the keyboard. There is a CAPS LOCK key. The standard one-wire SHIFT key modification is not supported.

NULL or CTRL-@ on the Apple turns out to be CTRL-# on the Keytronic. Likewise CTRL-SHIFT-M is CTRL (these differences may confuse you when you try to trigger some software functions).

Keyboard sensitivity is a boon to the fast typist and a problem to one less skilled. The slightest pressure brings a key response and grazing an adjacent key produces both characters. The usefulness of the special function keys is limited to BASIC programming in Apple DOS. The functions cannot be changed and do not apply to CP/M based programs.

Location of the CTRL keys may cause problems when reaching for the SHIFT keys, resulting in control characters rather than upper case. Use and familiarity eliminate many problems and there is much to be said for being able to place the keyboard anywhere one wants it. Keytronic.

Keyword A word which has special significance to a program. It must not be misspelled or used for other purposes, or erroneous results may occur. See Tokens for a complete list of keywords.

Kids Can't Wait The name given to Apple Computer's corporate plan to donate (and thereby introduce) computer technology to students in elementary and secondary schools. By the end of 1983, Apple Computer will have installed 10,000 computers in California schools, at a rate of one per school. Each school receives an Apple IIe computer with 64K RAM, a monitor, a disk drive, and Apple LOGO programming language.

KILL A command that is available to users of the CP/M application program called ED (EDitor). If the letter K is typed after any program line number during program entry, that line is deleted from the program. The insertion of the letter K executes the KILL command.

Kiss Financial Programs* Five programs are included, which offer a variety of business applications. Some of the services include ledger, mortgage acceleration program, estate valuation analysis, minimum deposit illustrations, term/whole life insurance comparison, capital needs analysis, amortization and depreciation schedule, financial goals analysis, and more. RE/International Systems Corporation.

Kleen-Line Regulator KLR-500* The Kleen-Line provides 500 watts regulated AC voltage for top equipment performance. The power line voltage ranges from 90 to 140 volts. Kleen-Line systems provide line-noise isolation and lightning-spike protection. Other models include 1000-, 1500-, and 2000-watt units. An integral Isolator option is available for all models. Electronic Specialists, Inc.

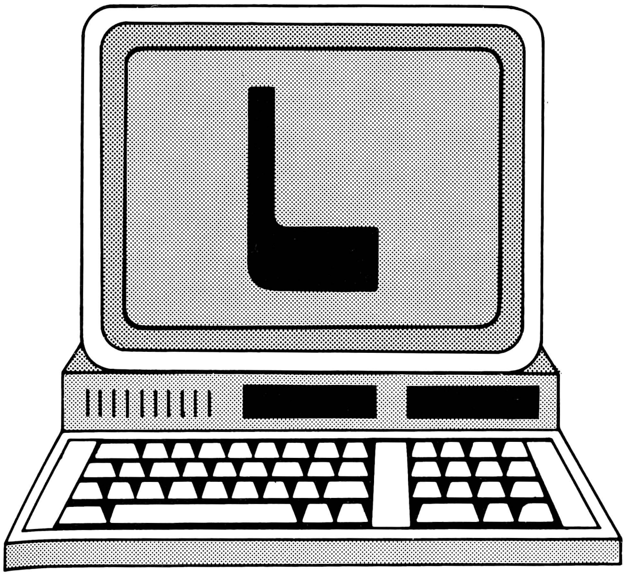
Know Yourself* A package of five self-help programs. Here's what you'll get: 1) Alcohol (using your physical data, this program will predict your behaviour when a certain number of drinks are consumed); 2) Sex Role (could you be androgynous?); 3) Life Expectancy (answer twenty questions and the computer will estimate your life expectancy); 4) Psychotherapy (would you benefit from psychotherapy? Find out!); 5) Computer Literacy (are you up-to-date on your bits and bytes?). 16K. Sensational Software.

Koala Pad* The Koala Pad is called a touch tablet. It allows you, with the proper software, to draw on the screen, using only your finger or a stylus to trace a design on the surface of the Koala Pad. These designs may then be saved to disk as pictures; later, they may be recalled and printed using the proper screen dump software. The Koala Pad is sold with the graphics program necessary to design and color your own pictures. Koala Technologies Corp.

KRAM* Keyed Random Access Method is modeled after the system used on IBM mainframes. Either full or partial key value offers extremely fast retrieval/storage of data in either direct or sequential mode. United Software of America.

Krogh* An employee information records system to hold and update data ranging from age and sex to salary and benefits. Create your own categories and format for up-to-the-minute company status. RE/International Systems Corporation.

Kussmaul Encyclopedia, The* A complete computer system that lets you look up subjects with automated cross-referencing and searching, read articles from various journals and newspapers, retrieve data on stocks and other financial information, and shop for items. Also runs games and educational programs. General Videotex Corporation.



L Codes. ASCII = 76, HEX = 4C. l—ASCII = 108, HEX = 6C.

[L]—Used with PIP Command The PIP command accomplishes a number of additional activities through the use of parameters placed in brackets at the end of the PIP command statement. One of these is the L parameter. If the letter L is placed in brackets at the end of a PIP command line, all upper case characters in the file being copied or transferred will be converted to lower case characters.

L Command Cursor The Apple III Console Driver offers three cursor commands to clear various portions of the viewport. Cursor commands are made available by pressing ESC while the user is in the input mode; then the various cursor commands are available with a single keystroke. If S is pressed, the viewport will be cleared and the cursor will be returned to the upper left corner of the viewport. If the letter P is pressed, the viewport will be cleared from the cursor's position to the end of the screen. The cursor's position is not changed by the use of this command. If the letter L is pressed in this mode, the line in which the cursor rests is deleted from the cursor position to the end of the line.

L Parameter Length parameter. When a binary file is saved in DOS 3.3 on the Apple II, Apple II+, or Apple IIe computer, five parameters are used along with the BSAVE command to ensure that the file is saved properly. Two of the five parameters are required and three are optional. The optional parameters are slot, drive, and volume. The required parameters are address and length. The L parameter is used to define the length of the file to be stored in bytes. This parameter must lie between 1 and 32767 to be valid (0 is an unacceptable length for any file and 37267 is the largest number of bytes which may be stored in a single field on a DOS 3.3 initialized diskette). The L parameter is also required with the OPEN command in BASIC to specify the length of the record to be dealt with in accessing a random access file. See A Parameter.

Lab Plots* Helps students when they analyze laboratory work involving graphics plots. Rectification of raw data helps in the discovery of natural "law." 48K. Educational Courseware.

Label Maker* This versatile label program will allow you to create address labels in a variety of formats. Both personal and business address labels can be printed in the correct format, as well as labels for foreign addresses. You can also generate mailing message labels, price tags, etc. The self-increment feature can be used to print theatre tickets with up to 26,000 different tickets for any given date. Applesoft; DOS 3.2; 48K. Connecticut Information Systems.

Label Splitter* Creates new, VisiCalc* compatible, text files in which selected wide-label entries are divided into two or more shorter columns. Choose the new widths and the number of columns you want. Data Security Concepts.

Laboratory Tool Kit I* A package of utility programs that perform interfacing functions between sensing devices and laboratory equipment, I.S. peripheral devices, and Applesoft BASIC. Some of the features include analog voltage and signal output, digital input and output, analog data acquisition, and a menu-driven program to help manage the devices and channels. Applesoft; Interactive Structures Lab Interfaces A113, A102, AD03, or D109. Interactive Structures, Inc.

Landlord, The* A package that lets apartment managers keep track of up to 400 units. Provides listings, reports, records, and analysis statements. This is a user-friendly program and does not require computer knowledge. 48K; 80-column printer. (Also available in The Landlord Version 2.0.) Mini Microcomputer Software.

Language Card A RAM card (16K of memory) which can be used to store the alternate language from the one in ROM. The ROM language is Integer BASIC for the Apple II, and Applesoft (floating point) BASIC for the Apple II+ and IIe. All languages must be loaded into RAM on the Apple III. Some ROM cards are built containing the language, so that it is always present when the computer is on. Neither the RAM or ROM card is necessary on the Apple IIe, which comes with 64K memory standard.

LANGUAGE NOT AVAILABLE Error message generated if you boot your computer with a DOS diskette other than the System Master diskette. The resident language for Apple II is Integer BASIC, and for the Apple II+ and IIe is Applesoft BASIC. If you try to RUN a program written in Integer on the Apple II+ or the IIe, or one written in Applesoft on the Apple II, you will receive the LANGUAGE NOT AVAILABLE message. If you have a 16K RAM card in the Apple II/II+, or are using the Apple IIe and boot with the System Master, the alternate language is automatically loaded into the top 16K of RAM. You then may run both Applesoft and Integer BASIC programs and the computer will select the appropriate interpreter (q.v.).

Language Skills (German, French, Spanish)* Eight-hundred entries offer a choice of English/Foreign or Foreign/English translation drills. Sliwa Enterprises.

Largest Line Number BASIC. The largest possible line number for a BASIC program is 32767 with Integer BASIC, or 63999 with Applesoft (floating point) BASIC.

Last One, The* A program that writes other programs for you. It allows you to write programs by asking questions about the program you wish to write. As you answer the questions, a program in BASIC is written by The Last One. The Last One also can modify a program once it has been written. Documentation and manufacturer support are good. The code generated tends to be relatively slow and sometimes cumbersome. D. J. AI Systems, Inc.

Latin Hangman* The player is allowed to see both the Latin and English words together, or chose translation in either direction. There are three improper choices allowed; on the fourth one, the Hangman wins and the correct answer is displayed. Score is kept, and at the end you are told how many of the list were correct the first time. Though Latin courses are not required in most schools today, this is a useful means for learning word roots in English. In addition to the vocabulary section, there are also sections containing famous Latin sayings and common sentences. The program is written in Integer BASIC. George Earl.

Lazer Chaser* A game for young students involving integer calculations. As they solve equations correctly, they will be promoted from cadet to commander. Sound effects keep students actively involved. 48K. Indian Head Software.

LCG-1/LCG-2* This plug-in device adds the full 96-character ASCII set to your monitor displays, including full lower case letters with descenders. The LCG-1 is designed for Revision 6 and earlier Apple IIs, while the LCG-2 is for Revision 7 and later Apple IIs. The package comes with a disk containing the necessary Machine language routines that let your computer handle the lower case letters. Legend Industries, Ltd.

Learning About Catalog Cards* Teaches you the information contained on library catalog cards. A card is displayed on the screen, and you are asked various questions regarding the card or the information thereon. In the case of incorrect answers, the program gives the correct answer and highlights its location on the card. Cassette or disk. Right On Programs.

Learning to Locate Books on the Shelf* Teaches you how books are located on the shelves of a library. The differences between fiction and nonfiction spine markings are explained, as is how to locate these books. Cassette or disk. Right On Programs.

Learning to Understand the Card Catalog* Through this program, the user learns how to look up a book in a card catalog. Three ways of locating a book are demonstrated through question-and-answer interaction with the computer. Cassette or disk. Right On Programs.

Learning to Understand the Copyright Notice* Teaches you about the copyright notice and stresses its importance. It also discusses acknowledgements and the preface. You are asked questions about the information and are rewarded for correct answers. Cassette or disk. Right On Programs.

Learning to Understand the Title Page* Teaches you about the title page. Each time you directly answer a question about the title page displayed on the screen you win a portion of a picture. At the end of the lesson, the completed picture is shown with comments on your progress. Cassette or disk. Right On Programs.

Learning to Use an Index* Using a "lost in the woods" theme, this program teaches the user about indexes. By correctly answering questions about the index on the screen, the user wins clues to assist him in getting home. Cassette or disk. Right On Programs.

Learning to Use the Table of Contents* The program uses a "maze" concept to teach you about tables of contents. By correctly answering questions on the screen about the table of contents, you can turn in the maze. When all questions are answered correctly, you are home. Cassette or disk. Right On Programs.

Least Cost Ration Formulation* Derives the least cost ration for any type of feeder operation. The user inputs the cost and nutritional information of possible feeds and the nutritional needs of the stock he is raising. The computer does the rest. Farmplan Computer Systems, Inc.

**LEFT$** BASIC Function. LEFT$ function returns the leftmost <n> characters of <x$>. The format is:

<stringvariable> = LEFT$ (<x$>,<n>)

<x$> may be any string expression.

<n> is a numeric expression which must be in the range 0 to 255. It specifies the number of characters you want in the result.

If <n> is larger than LEN(<x$>), the entire string <x$> is returned. IF <n>=0 a string of zero length is is returned.See LEN, MID$, and RIGHT$.

Left Arrow (←) Key Usage. Pressing the left arrow will move the cursor one character to the left. It will delete characters already typed in a program line, but not yet entered with a RETURN, on the Apple II/II+. On the Apple IIe, it merely moves the cursor. Although these are the recommended values, this key may be defined differently by various applications programs.

Left Justify See Justify.

Legal Accounting* A three-disk package that includes a main program disk, details disk, and a case disk. The program can handle a maximum of eight attorneys in a firm with up to 1200 active accounts. It is a very sophisticated program, designed for a bookkeeper who is familiar with legal terminology. Some of the legal classifications include: subrogation, insurance, real estate, divorce, criminal, wills, estate planning, probate—general probate—Juvenile, corporation, and bankruptcy. Any class can be changed or added. There are fifteen service codes and twelve billing codes. 48K; two disk drives; printer optional. FCI, Inc.

Legal Accounting* Handles accounting procedures and billing statements. Case histories may also be recorded for later retrieval. Computer House Div./FLC, Inc.

Legal Clerk* Scheduling appointments and billing statements are handled with ease. This is a great help to secretaries and bookkeepers. 48K; printer. Monument Computer Service.

Legend S Card* A memory expansion card for the Apple II, Apple II+, and Apple IIe computers. This card may be plugged into a peripheral slot in the computer. It has a capacity which may be expanded from 64K to one megabyte when 256K chips are available. This memory expansion card is best employed by selecting the pre-boot software that the manufacturer supplies. This software consists of VC Plus, which is supplied with all Legend memory expansion cards for making the expanded RAM available to Visicalc* users and a disk emulator utility disk which is also supplied with the hardware. Super Emulators and Pascal Super Emulators are available separately at extra cost to the user. Legend Industries, Ltd.

Legend 128KDE Card* This card works in any of the eight expansion slots on the Apple II/II+, or in the seven of the Apple IIe (it will not fit in slot 0 of the Apple IIe). It allows you to expand on-line memory and perform other functions as well. Since the 6502 CPU can only address 64K of memory at any one time, the additional memory must be selected by bank switching, which makes your programs run a little slower than usual. Unless you want to be involved in programming a large memory, you do not have to worry about selecting the particular bank of memory which needs to be active.

The hi-res capabilities on the provided software allow you to load several binary picture files (which usually require thirty-two to thirty-four sectors of disk memory each) into RAM and then switch between them rapidly in a slide-show emulation. Legend Mailer allows you to set up operation of a database that needs to access the disk drive regularly. In conjunction with the disk emulator capabilities of the 128KDE card, the database is loaded into memory and the access to the records is much faster.

The Ampercard utility and the VC Plus program are supplied on a disk that comes with the 128K card. The Ampercard utility, which is documented both on the disk and in the Manual, allows variables to be stored on the expanded memory card (128KDE) instead of in the top of the 48K that's found on the motherboard of the Apple II/II+. Thus the variables are more readily accessible, and less garbage collection or housekeeping (q.v.) is required as string variables accumulate in a program. The VC Plus program is an extension for your VisiCalc* as well as additional memory. Without using VC Plus, you will be using your 128KDE card as if it were only a

16K card. If you don't watch the "memory remaining" notation on the right corner of the screen, you may exceed even the 144K available; if you do so, the program will ring a bell and then hang, at which point you have to shut it off and start over again! It is obviously prudent to plan your template to stay within these bounds. Using 6300 cells (A1 to BK100) filled with formulae, rather than data or labels, occupies all but 33K of memory; this amounts to about 56 cells per 1K of memory. You will notice that the operation of VisiCalc is *noticeably* slower when using the 128KDE card, due to all the required bank switching. Also, the upper right corner does not flash when in the recalculation mode, so you don't really know if the program has hung up, or whether it is still working!

At the present time, this card will work on the Apple III only when it's in the Apple II emulation mode. Legend Industries, Ltd.

Leggs* Leggs is a stand for the Epson MX-80/100 and IBM printers. It consists of a set of four special legs that are installed in existing holes in the printer. This raises the printer so that a three-inch pad of paper can be slid underneath. No tools or drilling are needed. Paper can be accessed from all four sides. Leggs are made of clear acrylic plastic. Argus, Inc.

LEN BASIC Function. LEN returns the number of characters in <x$>. The format is:

```
<variable> = LEN(<x$>)
```

<x$ > may be any string expression.

The count returned includes blanks and unprintable characters.

Length Of File See LOF.

Length of File—BASIC When creating Machine language files, in order to BSAVE (q.v.) them, you must specify the starting address and the length (in bytes) of the file to be stored. The argument of length must be in the range 1 to 32768 or a RANGE ERROR message is generated. 32768 is the maximum number of bytes which can be stored in a single field on a diskette. If your file needs to be longer, you must use two or more BSAVEs.

Length of Line Printer Setting. To set to 80 characters per line (for example), enter the BASIC statement:

```
PRINT CHR$(9) "80N"
```

In the immediate mode you can enter the following to set 80 characters per line:

```
PR#1
CTRL-I (press both keys together)
80N
RETURN
```

As 80 characters per line is the default mode for the Epson printer, you can also achieve the same result by turning the printer off and back on again.

Length of Record BASIC. When creating random access files, you must specify the length of each record; all records in a file must be of the same length. It is a good practice to define the record length as that required by your longest piece of information (although that will waste memory space for other, less lengthy items). There is no way to find the length of a record in a random-access file; you must make this information a part of your file or a part of the program documentation.

Lessons in Algebra* Junior high students will learn the basics of algebra. 48K. George Earl.

Lesson-Tutorgraphs* A series of tutorial modules, each covering a single topic. A module presents the lesson material, as well as a good review in the form of relevant questions on the material. Good quality, hi-res graphics and animation are used, and a computer-graded test is included to facilitate self-or instructor-evaluation of the student's progress. Designed to be used as classroom aids, these programs are highly interactive and easy to use; they include user manuals that discuss lesson objectives, suggested uses, and the actual use of the programs. Topics available include weather fronts and shore features. Teach Yourself by Computer (TYC) Software.

LET BASIC Statement. The LET statement assigns the value of an expression to a variable. The format is:

```
[LET] <variable> = <expression>
```

<variable> is the name of the variable or array element which is to receive a value. It may be a string or numeric variable or array element.

<expression> is the expression whose value will be assigned to <variable>. The type of expression (string or numeric) must match the type of the variable, or a TYPE MISMATCH will be displayed.

The word LET is not necessary in BASIC programs when assigning values to variables. You may simply use the format:

```
<variable> = <expression>
```

Letter Post* Combines the capabilities of single sheet feed capability, the Auto Plot card, Font Writer, and mailing list with MPI graphic printers. Micro Peripherals, Inc.

Lexicheck* A spelling checker for text editing, is used in conjunction with Word Juggler*. There are over 30,000 words in the dictionary, and it can be expanded by the user for a customized vocabulary. A legal dictionary can be purchased separately. Quark Engineering.

Lexicom* This program will transfer and convert word processing files. For example, you will be able to interchange files from SuperText and AppleWriter. In addition, the program will edit BASIC programs, convert upper/lower case files to upper case-only files, and send files over telephone lines. Nibble.

Librarian List* A database for librarians that covers book loans, journal catalogs, want lists, staff lists, staff schedules, text editing, file transfering, and more. It also lets you design your own format for files. 48K; printer optional; Apple II with firmware card or Apple II+. Andent.

Library Skills* An educational package that helps students select reference material for a variety of subjects. With the help of Allie Gator, they must locate the information using the Dewey Decimal System, a card catalog, and other types of reference systems. A summary quiz must be completed at the end of the program. Micro Power & Light Company.

Life Expectancy* After answering questions on life style, family history, and personal habits, you can approximate the number of years you have left on planet Earth. Paul's Electric Computers.

Life in the Oceans* Emphasizes the importance of the oceans to human and other life on earth. Weather patterns and life cycles that depend on the ocean are included. A comprehension game follows that positively reinforces correct answers. Disk or cassette. Right On Software.

LIFO Last In First Out. Refers to method in which values are stored in a stack (q.v.).

Light* Compares light to sound, describes the properties of light, explains how light intensity changes, and how it creates heat. Includes a game to test your grasp of the concepts, and even has a section on lasers. Disk or cassette. Right On Programs.

Light* This program elucidates refraction, the electromagnetic spectrum, concave and convex lenses, and bending light waves. For the junior high school student. 48K. J & S Software.

Light Pen A peripheral device which, when used with the appropriate software, allows you to select items on the screen by pointing to them and pressing a button, rather than having to enter information from the keyboard. This method is extremely useful in CAD (q.v.) to move pre-designed segments around the screen when constructing a complete diagram.

Light Pen* The light pen allows you to interact with the computer directly through the monitor screen and bypass the keyboard. This package includes a fully self-contained light pen and the program and coding needed to make it work with your programs. 3G Company, Inc.

Light Pen Quiz, The* Teachers can devise multiple-choice quizzes, plus grade and keep an updated progress report for each student. Students, in turn, can use the light pen as an input source while taking the examination. 32K. Charles Mann & Associates.

Lighting Calculations (Indoor-Outdoor)* You can input desired foot-candles of illumination to this program which calculates the number of fixtures required to meet that demand. Figures may be generated for incandescent, high-pressure sodium, and flourescent sources. Utilities Engineering.

Limacons and their Areas* A graphic three-part program. Part one describes limacons with the equations, r=a+bsin(t) or y=a+bcos(t); part two allows the user to define the values of a and b and cosine or sine; part three allows the user to calculate various areas enclosed by the limacon. 32K. Math Software.

Liming Soil* The user inputs soil analysis results and the proportional content of the liming material to be used, and the computer determines the number of pounds needed to balance the soil's composition. AG-COM.

Limited Color Mode The Apple III computer offers the user four different graphics modes. One of these, the limited color mode, uses 192 horizontal lines with 280 dots per line and with limited color capability. This mode is called Mode 1. It has an alternate screen called Mode 5. The resolution of the screen display generated in this mode is the highest resolution available on the Apple III. The color display generated is actually a color display overlayed on a black and white display. Colors in this display tend to bleed into each other horizontally because of the manner in which they are generated.

Limits of Sequences* Graphically displays fifty-five terms of a user-selected sequence. Sequence choices can be selected from a menu or specified by the user. Math Software.

Line—Blank On printer. See Printer—Blank Line.

Line—Continue on Next Line of Screen To continue the same logical line on the next screen line, press CTRL-J (both keys together.) See Control Characters.

Line Editor Edit means to change the contents of either a program file or data file. Editors are classified as line-oriented editors if they basically work on one line at a time and deal with text by line number. Word processing programs have their own built-in editor; other languages besides BASIC have built-in editors. Some software packages (VisiCalc*, some database systems) also have built-in editing capabilities. See Moving Cursor and Program Line Editor.

Line Feed Press CTRL-J (q.v.) to continue the same logical line on the next screen line.

Line Feed—Printing See Printer—Advancing One Line.

Line Length Maximum in BASIC. The maximum number of characters in any one BASIC program line is 239. You will likely not approach this limit unless you are using many statements on one line separated by colons (q.v.). The one time that using a multiple statement line is very useful is when you are planning to print a full screen of text. By judiciously using multiple statements, you can be sure that the words you type will always appear on one line, or will have any hyphens separating them in the proper place. Use the following technique on the 40-character screen:

Type the line number and use the question mark (?) as the abbreviation for PRINT. Type the opening quotes and your text until the closing quotes are directly under, or one to two spaces to the left of that point. Type a semi-colon and a colon (if the quote marks are directly lined up), or a colon (if the closing quotes are to the left of the opening-quotes column). Then type a question mark and an opening double quote, and more text. You may continue this way for a maximum of five continuous PRINT statements. This gives 200 characters of text; the remainder of the 239 allowable characters are taken up with commands (? marks) and delimiters (; and :). An example of this technique follows.

```
123 ?"THIS IS A SAMPLE OF THE WAY A
PROGRAM":?"LINE WILL APPEAR WHEN YOU
TYPE IT IN US-";:?"ING THE 40-COLUMN
SCREEN. YOU CAN CON-";:?"TINUE TYP-
ING IN THIS MANNER UNTIL YOU ":?"HAVE
FIVE QUESTION MARKS ON YOUR LINE."
```

Line Length—Printer Setting You must notify the printer that the next command is for the printer rather than for DOS, the resident interpreter, or some other peripheral. Typing PRINT CHR$(9) in a BASIC statement or CTRL-I in the immediate mode—CHR$(9) is the ASCII code for CTRL-I—followed by the "132N" will activate the condensed type mode. If you do not do this, you will be typing in normal size type (ten characters per inch) and will write over about half of each line, rendering your copy totally useless.

Line Number Largest in BASIC. See Largest Line Number.

Line Number Where Error Occurred If you first execute an ON ERR statement, use the following line to set X equal to the line number where the error occurred.

```
X = PEEK (218) + PEEK (219)*256
```

This line should be used as a part of the referenced line in the ON ERR (q.v.) statement.

Line Numbers Renumbering in BASIC. See Renumber.

Lineages* A four-program package for keeping track of your genealogy research. Lineages will enable you to display your most up-to-date information either as a printout or as a screen display. The four programs are: 1)Edit (stores basic family information), 2)Output (displays or prints out family information), 3) Search (looks through the data you've stored for specific information); and 4) Text (card file system for storing data that doesn't fit into "regular" categories). This is a user friendly system that is menu-driven. 32K. Quinsept, Inc.

Line-Oriented Editing The cursor is the flashing box (on some programs it is the underline character) which appears on the screen to let you know where an action (such as typing in a character, deleting, inserting, etc.) will take place. The cursor moves to the right as you type and backs up to the left when you press backspace (CTRL-H), the left arrow, or the DELETE key (Apple IIe or III). Backspace and DELETE erase the characters from the screen as the cursor moves left while the left arrow may or may not, depending upon the software package you are using.

In BASIC, editing is restricted to the current line, or line-oriented editing. In many situations it is necessary to first position the cursor to the correct location, then enter certain characters at that location. In Applesoft, characters entered will erase/replace those which were on the screen; to insert characters, you need to type them in and then retype the rest of the desired line. If you only need to change one character or insert a character where there is presently a space, you may move the cursor as discussed, insert/change as required, and then copy over the rest of the program line by the use of the right arrow key. See Moving the Cursor.

Line-Oriented Editor Editors are classified as line-oriented editors if they work on one line at a time and deal with text by line number. By contrast, full-screen editors allow you to change any data currently displayed on the screen. Most treat paragraphs or entire documents as a unit, allowing reformatting, changing of margins with justification, block moves, etc. Most word processing programs are full-screen editors.

The BASIC editor lies between these two categories. It allows you to change any BASIC line on the screen, but still treats the data as a collection of lines. You must press RETURN while the cursor is at the end of the line you have changed with the BASIC editor or the changes are not effective.

Lines Deleting BASIC program lines. To delete program line 100 enter:

```
DELETE 100
```

or just

```
100
```

To delete program lines 100 to 200 enter:

```
DELETE 100-200
```

To delete all program lines up to 100 enter:

```
DELETE -100
```

To delete program lines from 100 onward with DELETE you must specify the final line number. If you want to delete lines to the end of your program, either LIST to find the last line number or enter a dummy line at the largest possible line number (65529). Then enter:

```
DELETE 100-65529
```

A dummy line might be:

```
65529 END
```

Lines—Screen Display BASIC Program. To display all program lines, enter:

```
LIST
```

To display program lines from start up to line 100 enter:

```
LIST -100
```

To display program lines from line 100 to end enter:

```
LIST 100-
```

To display program lines from line 100 to line 200 enter:

```
LIST 100-200
```

To display program line 100 only enter:

```
LIST 100
```

To freeze the list to read it while it is being displayed press CTRL-S (Apple II/II+ or IIe) or CTRL with 7 from the numeric keypad (on the Apple III.)

Lines per Inch (6) Setting the printer. See Printer—6 Lines per Inch.

Lines per Inch (8) Setting the printer. See Printer—8 Lines per Inch.

Lines per Inch (72/7) Setting the printer. See Printer—72/7 Lines per Inch.

Lines per Page See Printer—Page Length.

Lines, Program To start a new program, type:

```
NEW
```

This completely erases all lines now in BASIC's memory. If there's something you want to keep and haven't already stored it on diskette, SAVE it first. If you don't erase the program in memory before starting on another, you will usually wind up with an unusable combination of lines from your old and new programs.

Linguist* Learn a new language or regain fluency in a language that has grown rusty. Japanese, Hebrew, Russian, Greek and other languages are included. You enter words, definitions, phrases, and phonetic pronunciations which then are stored; you are tested when you are ready. 48K. Synergistic Software.

Link Systems Communications and Data Management Software manufacturers. See DataLink and DataFax.

Link Time The point in the processing of a program with a language translator (compiler or assembler) when the program is tailored for a specific memory location. This occurs after compiling (compile time) but before execution (execution time). Some small systems do not require linking.

Linker* A linking loader/editor with the following features: loads and relocates Assembly language programs in RAM, combines a main program with pre-assembled subroutines, produces a map of loaded routines, automatically loads subroutines as needed, searches more than one disk for subroutines, packs routines together or forces them to even page alignment, can be called as a subroutine to load programs during execution or manage overlays, and contains a library of ready-to-use subroutines. This is best used by experienced programmers, but is also a useful tool for the novice Assembly language programmer. 48K. Quality Software.

Linkover* After selecting gene combinations and adjacent genes, students can develop precise gene maps for experimental purposes. Linkage maps for ten genes are created using the three-point test-cross method. An instruction manual is included. 48K. Conduit.

Linksampler* Frustrated programmers who gave up on learning Pascal, this program is for you. The Linksampler will teach you Pascal gradually and easily while maintaining your interest. Programs include a cross-section of business, math, and game programs to teach you various concepts. A thoroughly documented manual is included. Link Systems.

Liquid Manure and Fertilizer* Uses soil test results and manure contents information to determine the amount of liquid manure and possible commercial fertilizer needed by the soil. AG-COM.

Lisa* A personal/business computer introduced by Apple Computer, Inc., in 1983. This computer uses an MC 68000 microprocessor with a 32-bit internal architecture and a 16-bit external data path. Disk storage for the Lisa is 860K for the disk drive when disks are formatted by the operating system. Lisa uses 16K of ROM and can support up to 1M of RAM. This computer is equipped with two serial interface ports and one parallel interface port. It has an RS-232 interface with full duplex capability. Full modem control with software driven baud rates is available.

Lisa accepts input from a detachable keyboard or a mouse. The mouse is a device which moves a pointer around the screen to select various functions. It is mounted on a roller and the computer executes the command or function designated by the mouse's pointer.

The Lisa can use BASIC, Pascal, COBOL, Lisa Editor, Assembler, Linker, Debugger, and other utilities. Integrated software is provided for Lisa. This includes LisaCalc (a 255 column by 255 row spreadsheet program); LisaList (a 600,000 byte list manager); LisaProject (a sixty page schedule manager program); LisaWrite (an advanced word processor capable of integrating spreadsheets from LisaCalc, lists from LisaList, graphs from LisaGraph, and drawings from LisaDraw, complete with a variety of type faces and sizes), LisaDraw (a graphics program that can be used to generate office layouts, organization charts, technical illustrations and drawings, sketches, maps, schematics, and all sorts of diagrams); and LisaGraph (a business graphics program that can access data from LisaCalc and can be used to generate bar graphs, line graphs, pie charts, and graphs which combine bar and line graphs). Apple Computer, Inc.

Lisa Educational System* Begin producing Machine language almost immediately and gain a greater understanding of your computer and Assembly language. The book, *Using 6502 Assembly Language,* which is included in the package, easily explains how Assembly language works. A powerful and proven method for developing your ability to write complex Assembly language programs. Lazerware.

Lisa 2.5 (Assembly Language Development System)* Many users have enjoyed this programming utility. Assembly language programs are fast and easy to learn. Most commands are set up with psuedo-op codes and mnemonics for easier use and better performance. Lazerware.

LISP LISt Processing. LISP is a programming language oriented toward symbols as other languages are oriented toward numbers. LISP permits the building and discarding of intermediate structures; you need not worry about how to find and later reuse the space necessary for storage. The syntax of LISP is simple and elegantly defined. The natural method of building programs in LISP by function composition encourages good programming style and facilitates modular programming.

LISP: The Language* LISP stands for LISt Processing, a fast and high-level computer language that has been used in the area of artificial intelligence research, and simulations of computer intelligence. This utility program can be used in a number of applications including engineering, database, business, scientific analysis, and other problem-solving needs. Datasoft.

LIST BASIC Command. LIST command displays the program currently in computer memory, or other specified device. The format is:

```
LIST <linum1> -<linum2>
          or
LIST <linum1>, <linum2>
```

<linum1> and <linum2> are valid line numbers in the range 0 to 63999. <linum1> is the first line to be listed and <linum2> is the last.

You can cause the LISTing to the screen to pause so you can read it, by pressing CTRL-S; you can start the LISTing again by pressing any key. You may use CTRL-C (both keys pressed together) to interrupt a LISTing, but you will not be able to start it again without another command. You can list an entire program simply by entering LIST.

Three options are available when using the hyphen(-):

1. If you declare only <linum1>-, that line and all higher numbered lines will be listed.
2. If you declare only -<linum2>, all lines from the beginning of the program through linum2 will be listed.
3. If you declare both line numbers <linum1>-<linum2>, all lines from <linum1> through <linum2>, inclusive, are listed.

For example:

LIST 100

lists only line 100

LIST -200

lists from the beginning of the program through line 200, inclusive

LIST 200-300

lists lines 200 through 300, inclusive.

List All Files on a Diskette When you have loaded DOS by booting a disk (q.v.) which contains the DOS image, you may obtain a listing of all the files on the disk by typing CATALOG. The list will display twenty file names at a time and pause; you can continue the list by pressing any key. This is useful for finding a program or file if you are unsure of the exact spelling of its name. If you still cannot identify your program from a CATALOG listing, you may have to load and list likely-looking candidates until you find it. This points out the usefulness of program and file names that remind you of what their purpose is (mnemonic names), and of a REM at the start of each program to make it easy to identify when listed. If your file names contain control characters which are not listed on the screen, you must remember to insert the required control characters in the proper sequence as you enter the name of the program to be LOADed or RUN, or a FILE NOT FOUND error message will be generated.

List Devices Command One of the options available to the user of the Apple III Filer Program is the list devices configured option from the filer menu. This command is executed by pressing L while the menu is on the screen. When the command is executed, the screen will display a list of all of the devices connected to the Apple III. This includes the console, printers, and disk drives. It will also display the name of any disk which is in a disk drive.

List Master* A series of Applesoft program-listing utilities: Applespeed, Renumber Plus, Lister, and Comp-List. Applespeed will perform any one of five different functions to speed the execution of your program: list lines containing invalid GOTOs; delete REMark statements; reduce all variables to the first two letters, rather than having extended variable names; combine lines with the use of colons wherever possible; and renumber the program lines by 1s. The delete REMark function also redirects any references (GOTOs, etc.) to the next line number. (Since you, as a good programmer, have followed the programming practice of not using a REM line number as a reference, this procedure will not need to be followed!) Shorter variable names are more quickly accessed by an Applesoft program, as are combined lines. Renumbering by 1s reduces program-space overhead required for line numbers in memory, as the Apple requires one byte for each digit in a number. This is especially important in large programs. All of these changes should then be saved under a modified program name; never save with the same name, or your original program will be written over.

The additional abilities of the Renumber Plus program, over and above those found on the System Master diskette that comes with the Apple, are the override feature (eliminates the check for invalid control transfers), the extension of maximum values for line numbers from 63999 to 65535 (63999 is the highest line number allowed in Applesoft), and the preservation of line numbers ending in a specified number of zeros. This last capability is especially nice if you have a series of subroutines stored as text files, which you EXEC (q.v.) into memory as you develop a program, and for which you have already memorized the reference(s).

The Program Lister allows you to specify parameters before LISTing to the printer, so that you can leave a left margin which will allow insertion into a three-ring binder, specify page length to skip over perforations in fan-fold paper, or to stop at the end of each page to insert a new single sheet. In addition, you may save the program to disk as a text file, where it may be more easily edited with a text editor or word processor which handles Applesoft text files.

Comp-List is a unique feature, allowing the comparison of two versions of a program, each of which has been saved as a text file (the comparison is done on the text files, not the actual programs). This comes in handy by showing you the changes you have made in program development, as well as in sharing modifications between two different programmers at different locations. The comparisons may be displayed on the screen or on the printer;

the printer output can be formatted as with Program Lister. Southwestern Data Systems.

Listings* A tool for organizing real estate listings within specific categories that include all the information needed for a complete picture of the property. Printouts can be done for one listing or the entire group. Computer House Div./FLC, Inc.

Little Jiffie* This mailing list program is easy-to-use and includes what is reportedly the fastest sort in the industry. Requires Centronix 776 or equivalent. Cassette. Programmers Software Exchange.

Little Tricks* A tutorial of programming techniques for the advanced beginner. There are twelve Applesoft routines and seven Integer routines covering such areas as how to make the program know when certain keys are pressed, how to set and use flags, how to sort, and more. Softagon.

Livestock Breakeven Analysis* Includes two programs for analyzing livestock production expenses vs. profits from livestock sales. One is for cattle, the other for feeder pigs. Given the expected maximum value per head it will calculate the most that can be payed for feeder livestock and the breakeven price. Decision Data, Inc.

Living Things* Discusses the life forms on Earth and how they interrelate. Plants, animals, and human beings are the main focus of the program which is followed by a game which tests comprehension. Disk or cassette. Right On Programs.

LOAD A CP/M .COM file which converts an assembled HEX file into a .COM file as it loads the file into the system. (This file is, in effect, a transient command). The syntax for using this command is:

```
LOAD <filename>
```

followed by RETURN if the file is on a disk in Drive A.

LOAD BASIC Command. LOAD takes a program from the specified device and places it into computer memory. The format is:

```
LOAD
```

from a cassette or

```
LOAD <file name>, [Dr]
```

from a disk drive.

[Dr] is the number of the drive containing the diskette with the program you want LOADed. If you do not specify the drive number, the default drive is assumed. Since no file name is associated with a file on cassette tape, you do not specify it either when LOADing from tape or SAVEing to tape. If you have several programs on the same cassette, you must be careful to leave sufficient blank tape between programs so that you may correctly locate the beginning of your desired program before LOADing it into computer memory.

Load Binary Data with BASIC Machine language programs. See BLOAD.

Load DOS When booting (q.v.) a disk, the DOS image (stored on the first three tracks (0 through 2) of the diskette is loaded into memory. Any previous memory contents are erased and work not previously saved will be lost.

Load Module A file containing object code ready to load into memory.

Load Time The point in the processing of a program when all translation and linking are completed and the program is loaded from disk or tape into memory for execution.

LoadCalc* Converts test files into "Visi" datafiles. A complete menu and selection of commands makes this a very powerful aid. Data may be edited, converted to decimals, analyzed, or selected. 48K; 16-sector. Micro Decision Systems.

Loan Amortization Schedule* A program to calculate and display loan payment schedules. A running loan balance is shown, as well as the individual payments divided into principal and interest. Yearly interest totals are given, and all information can be printed out if desired. Cassette or disk. Realty Software Company.

Local Names Apple III SOS uses volume names to identify disks in a disk drive rather than volume numbers. It also uses directory and subdirectory names to classify files on a particular disk. Files which are included in directories or subdirectories are given local names under this system. These names may use letters, numbers, and periods and must begin with a letter.

Location of Cursor BASIC. You may determine the location of the cursor by the use of the BASIC statements:

```
X = PEEK (36)
     or
Y = PEEK (37)
```

where X will be the horizontal value of the cursor position (in the range 0 to 39) and Y will be the vertical position (in the range 0 to 23.)

LOCK DOS Command. This command, which has the format:

```
LOCK <file name> [,<slot #>
  [,<drive #>[,<volume #>]]]
```

will allow you to protect a file from accidental deletion or change. If the slot and drive numbers are not specified, the default drive is assumed. If the volume number is not specified, it will remain the volume number which was assigned to the diskette during the initialization process. If you specify a volume number which is not the same as that which is on the diskette in the active drive, a VOLUME MISMATCH error message will be generated. When a file is locked, an asterisk (*) will be displayed alongside its listing in the CATALOG.

Locked-Up Keyboard DOS. Upon resetting the system and reloading DOS, any applications program will be stopped and any current work not previously saved will be lost (erased from internal memory). As a last resort, you can remove the diskette from the drive, turn off the computer, and do another cold start. See Reboot.

LOF Length Of File. Each operating system that may be employed on Apple computers provides you with a method of determining the length of the files that are stored on disk. DOS 3.3 displays file length in sectors used when the CATALOG command is entered. Apple III SOS displays file size and file location when the List Files option is selected from the File Handling Command Menu on the Apple III utilities disk. The STAT command in CP/M may be used to display file size and memory space used.

Log All Screen Activity to Printer The use of the BASIC command PR#<n>, where <n> is the slot in which your printer card is located, will cause any information printed on the screen to be echoed to the printer. The BASIC command PR#0 will cause output to appear only on the screen. PR#0 is the default condition.

Logical Device Names In CP/M, logical device names are used for general descriptions and to access peripheral devices. Rather than direct the computer to communicate with a printer, a more general term is used. The term used for printer is "list device" and is abbreviated as LST when instructing a program such as PIP to transfer data to it. The term "console" is used to describe the keyboard and screen. This term is shortened to CON when it is used with PIP or other programs. The term "punch device" describes a mass storage device connected to the computer. It is abbreviated as PUN, which also refers to output communications with such a device. Input from mass storage devices is accessed through the RDR abbreviation, which stands for "reader." The disk drive designators associated with the CP/M prompt are used to direct files to and call files from disk drives. The B: prefix is used to change from Drive A to Drive B or to direct files from Drive A to Drive B.

LOGO* A powerful educational computer programming language. Developed by M.I.T. and the National Science Foundation, LOGO can be learned by all beginning programmers at any age, and this version takes full advantage of the Apple II's graphic, sound, and color capabilities. It features commands that are graphics-oriented; learning this language creates a strong foundation for more advanced computer use and study. Krell Software.

LOGO Language* LOGO is an easy-to-use but powerful computer language which teaches computer use and logical thinking to children and adults. Using simple graphics commands, children learn to enjoy the computer. The language also lets you write powerful programs very easily and simply. This package comes with a six-program demonstration package, ranging from graphics for children to a physics demonstration. 48K. Terrapin, Inc.

LOMEM The lowest memory address location available to an Applesoft program. Below this value is the location of Applesoft language. Firmware (ROM) Applesoft sets LOMEM at 2048 ($0800). If DOS is booted, LOMEM is set at 12291 ($3003); DOS requires the intervening 10K of memory. The Applesoft program lines push LOMEM up. Variables are stored, starting at LOMEM and building upward.

Loop BASIC. See FOR and NEXT.

Loop, Delay Hold Screen Display in BASIC. To freeze the screen briefly while the operator using your program reads a message, just write a delay loop after you print the message:

```
1000 FOR Y = 1 TO 2000
1010 NEXT Y
```

To freeze the screen until the operator is done with it, put in a dummy input statement, instructing the operator to press ENTER to proceed. The input variable (A$) need not be used in your program:

```
1000 INPUT "Press ENTER to continue";A$
```

Low-Resolution Graphics On the Apple screen, the low-resolution graphics mode allows a screen of 40 by 40 blocks, and the use of sixteen different colors. The colors are:

0	BLACK	2	DARK BLUE
1	MAGENTA	3	PURPLE

4	DARK GREEN	10	GREY
5	GREY	11	PINK
6	MEDIUM BLUE	12	GREEN
7	LIGHT BLUE	13	YELLOW
8	BROWN	14	AQUA
9	ORANGE	15	WHITE

See COLOR=, HLIN, VLIN, and PLOT.

Low-Resolution Shapewriter* Create hi-speed lo-res shapes in programs with this combined Assembly language and Integer BASIC package. Nibble.

Lower Case Adapter ROM* This ROM chip replaces the character generator ROM on Revision 7 and newer Apple IIs and gives you lower case capabilities on your computer. Comes complete with a disk containing lower case character handler routines which can be easily integrated into DOS. M.D. Software.

Low-Res Sketch Kit* Colorful pictures can be combined to create a slide show or can be printed individually. Commands are executed through the use of the keyboard. 48K. MPA Enterprises.

LPS II Light Pen System* This hi-res light pen system lets you draw directly on the screen. Includes Pentrak, a light pen driver that gives you creative control over light pen graphics programs and Pen Painter, a color sketching system that gives you the ability to fill in sketched areas. Requires a RAM or ROM card; DOS 3.3; CRT. Gibson Laboratories.

LPT The CP/M abbreviation for Line PrinTer. This is a list device.

LRC Longitudinal Redundancy Check. See CRC.

LSB Least Significant Bit.

LST If the CP/M user wishes to direct output to a printer rather than to the console, he must use the logical device name abbreviation for list device, in order to direct the output. This abbreviation is LST. An example of using this method follows:

```
PIP LST: = WAGES.BAK
```

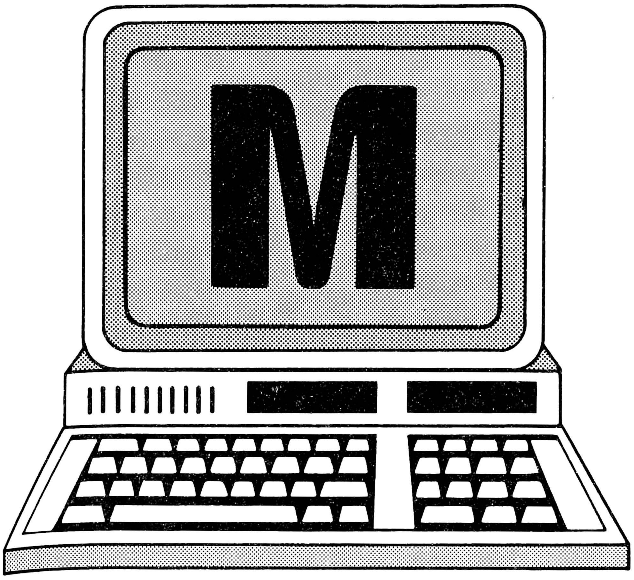
This instruction tells PIP to copy the backup file called WAGES from Drive A to the printer. For more detailed information, see Logical Device Names.

Lucky Day Numerology Report A report writer based on numerological analysis of anyone's name and birthdate. It will produce four pages of text in these categories: 1) Name (suggestions and advice on appraisal of the name), 2) Birthday (breakdown of birthday number with advice), and 3) Lucky Day Report for One Year (gives lucky days for each month with advice on when and where not to gamble). 48K. Matrix Software.

Lucky Lottery Report* Supplies your lucky numbers every day for one year. The exact numerological relationship of your name and birthdate numbers to the present date forms the basis of Lucky Lottery Report. 48K. Matrix Software.

Lunar Returns* Will give you return house cusps that are correct within a minute. AGS Software.

L.U.S.T.* Whatever your sex, age, or desires, this program will respond quickly to your wildest wishes and commands. Have fun with this one! Paul's Electric Computer.



M Codes. ASCII = 77, HEX = 4D. m—ASCII = 109, HEX = 6D.

M Key ESC-M. Used in editing. See Moving the Cursor.

Machine Language CP/M. Machine language files (programs) are generated in CP/M by using an Assembler. The ASM command available on the CP/M systems that run on Apple computers, converts such Assembly language files to Machine language files. All Machine language files are written in binary code.

Machine Language Graphics* Identical to Graphic Software for Microcomputers*, only these programs are written in Machine language. 48K. Kern Publications.

Machine Language Program All programs that run directly on the Apple are Machine language programs in the actual numeric instruction code of the Apple's 6502 microcomputer chip. Because these numeric instructions are actually a measure of the electrical pulses and are represented by 1 and 0 (q.v. Binary Number), almost nobody programs directly in true Machine language. Most programs are originally written in higher level languages such as FORTRAN, COBOL, or BASIC, or in Assembly language (q.v.). These are then translated by an Assembler (Assembly language), compiler (FORTRAN or COBOL), or interpreter (BASIC), producing an object program.The object program contains the Machine language instructions for the Apple's 6502 which correspond to the instructions of the original source program.

BASIC works in a slightly different way. A Machine language program which is in the ROM (q.v.) is a program that uses your BASIC program as a guide to what it should do. It is therefore an interpreter, processing each line of your source program and interpreting what should be done. Since it must reinterpret your source program each time you run it, interpreted BASIC can be as much as 100 times slower than compiled BASIC.

When you write a BASIC program, you have produced a source program in text form. The BASIC interpreter, itself a Machine language program, uses your source program as data—a source of instructions or commands to control its execution.

Suppose you decide to speed up a BASIC source program by compiling it into a faster Machine language program. You will need a BASIC compiler, a program not supplied with the Apple, but available from various software houses. You will run your BASIC compiler, giving it the source program that you wrote as input. The BASIC compiler will then translate your source program into an executable Machine language object program.

Machine Language Program—Load with BASIC. See BLOAD.

Machine Language Program—Save with BASIC. See BSAVE.

Machine Language Program—Subroutine from BASIC. See CALL and USR.

Machinery Management Series One* Three programs in one package for managing different areas of farm machinery ownership. The first helps determine the cost of operation for any type of agricultural machinery in units per acre, per year, or per hour. Cost categories are broken down to include fuel, taxes and depreciation, interest, and insurance. They are further distinguished as fixed or variable costs. The program also takes into account how the cost of operating machinery increases over time. The second program is a lease/buy comparison which calculates the cost of buying and financing equipment versus the cost of leasing it. It will also perform "what if" calculations analyzing the effect of different depreciation and financing options. The third program performs an ownership/hire comparison which evaluates the cost of ownership, including taxes and maintenence versus the total cost of custom hiring. Final calculations indicate which option is most expensive in your particular situation. Harris Laboratories, Inc.

Macro Assember A program in CP/M that converts Assembly language programs to programs in binary code by allowing the programmer to use Macros. Macros are single-word or single-keypress commands that instruct the computer to execute a complete series of preprogrammed steps. Macro Assemblers save time for the user by employing preprogrammed routines (stored in libraries) that are an integral part of the Assembler program. These routines are accessed as part of the command structure of the Assembler, by using a Macro command to accomplish a specific purpose, rather than laboriously entering each step individually.

Macro Commands See Keyboard Macros and Macro Assembler.

Mag Files for the Disk II* Files magazine articles in six different modules which allow you to retain memory. Mag File Create opens both a master file and a subfile by subject name and code number. Mag File Search uses these names and codes to search the files for display purposes. 16K. Southeastern Software.

Magazines, Computer A number of popular magazines contain useful information concerning the Apple, and available hardware and software for it. Most computer stores and larger bookstores carry a good assortment of these magazines. *BYTE* is an excellent source for general information on microcomputers, although information specifically relevant to the Apple is buried amid voluminous ads and articles on other machines and general topics.

Magazines devoted to the Apple and its compatibles include: *Softalk, Nibble, inCider, Hardcore,* and *Peelings II.* Magazines which specialize in the Apple and one or more other microcomputers include: *Softline* (games only), *Creative Computing,* and *SoftSide. InfoWorld* is a weekly newspaper for microcomputers including the Apple. It is valuable if you want to keep up with new developments on a week by week basis.

If you want to subscribe or write for information, here are the addresses:

Apple for the Teacher and
Apple Educators' Newsletter
9525 Lucerne St.
Ventura, CA 93004
805-647-1063

Applesauce
12804 Magnolia
Chino, CA 91710

The Apple Shoppe
P.O. Box 701
Placentia, CA 92670

Apple Education News
P.O. Box 20485
San Jose, CA 95160

The Apple in Education
3413 NW 8th Avenue
Gainesville, FL 32605

Apple Seed
P.O. Box 68
Milford, NH 03055

Apple Assembly Line
P.O. Box 280300
Dallas, TX 75228

Apple Orchard
International Apple Core, Inc.
908 George St.
Santa Clara, CA 95050
$24.00/year (12 issues)

BYTE
Subscription Dept.
P.O. Box 590
Martinsville, NJ 08836
$19/year (12 issues)

Call A.P.P.L.E.
6708 39th Ave., W.
Seattle, WA 98136

The Cider Press
1515 Sloat, Suite L
San Francisco, CA 94132

Creative Computing
P.O.Box 789-M
Morristown, NJ 07960
$20/year (12 issues)

Hardcore Computist
P.O. Box 44549
Tacoma, WA 98444
$20/year

inCider
Subscription Dept., P.O. Box 911
Farmingdale, NY 11737
$25/year or $53/3 years

InfoWorld
Circulation Dept.
Box 837
Framingham, MA 91701
$25/year (52 issues)

The Journal of Computers in Mathematics
P.O. Box 4455
Austin, TX 78765

Micro Medical Newsletter
7594 San Remo Trail
Yucca Valley, CA 92284

Neat Notes, The Newsletter of the New England Apple Tree
Box 2652
Woburn, MA 01801

Nibble
MicroSparc, Inc.
Box 325
Lincoln, MA 01773
$19.95/8 issues (U.S.)

Peelings II
945 Brook Circle
Las Cruces, NM 88001

Stems From Apple
9195 Southwest El Rose Court
Tigard, OR 97223

Softalk
P.O. Box 60
North Hollywood, CA 91603
Send Apple serial number for a 6-month complimentary subscription. Afterwards, $24/year without sponsor, $18/year with sponsor.

Softline
P.O. Box 60
North Hollywood, CA 91603
(same publishers as for Softalk)
6 months free subscription with Apple serial number, afterwards, $12/year (6 issues)

SoftSide Publications
100 Pine Street
Holmes, PA 19043
magazine only: $24/year (12 issues)
magazine and media: $125/year (12 issues plus 12 corresponding diskettes)

Magazine Files* Catalogues magazine articles on disk by subject. 16K. Southeastern Software.

Magic Keyboard* You can turn your Apple keyboard into a numeric ten-keypad configuration, The Dvorak Simplified Keyboard, Hexadecimal Keypads, and others. Gives accountants, secretaries, programmers, and parents the ability to choose between the standard Qwerty keyboard and other arrangements. Southern California Research Group.

Magic Mailer* Merges letters with address files to generate form letters. Can be used with Magic Window* to handle mailing lists of all sizes. 32K; requires Magic Window Word Processor*. Artsci, Inc.

Magic Paintbrush (Graphics and Games)* A basic graphics program designed for younger children that will instill in them the love of art and the computer as well! Your child can play with a simple drawing program and something called "the shape module" from the complete graphics system. The child will draw with paddles and use the paintbrush mode. Five games are included. 32K. Penguin Software.

Magic Spell* Graphics and music make spelling lessons fun and exciting. Battle with dragons, demons, and wizards during your struggle for correct spellings. Apple Computer, Inc.

Magic Spell* A spelling correction program that includes a 20,000-word standard usage dictionary. Easy-to-use for the beginner, it offers a spell check document, individual word review, and can be used with Magic Wand*. 32K RAM; CP/M. Peachtree Software, Inc.

Magic Type* If you have a Royal or Adler 5010 electric typewriter, all you need is this interface card and a six foot-cable (included) to have a letter quality printer for your Apple computer. Word-Power.

Magic Wand 2.0* A complete word processing system that offers block manipulations, printing and formatting, printing from edit, search functions, file handling, merging with external data files, insertions, character replacement, and cursor control. 48K; CP/M. Peachtree Software, Inc.

Magic Words* A proofreading program similar to Magic Window* that offers simplicity, accuracy, and a variety of menu selections. An outstanding feature is the ability to copy a corrected document file on disk without having to re-edit. Artsci, Inc.

MagiCalc* An electronic spreadsheet that is menu-driven, includes help and error messages, and is compatible with Magic Window*. Other features include formatting of printed page, invisible columns, printing of entire worksheet in pages, protected cells, and ability to print formulas and formats. 48K. Artsci, Inc.

Magnetism* Presents topics in magnetism to junior high school students. Subjects covered are compasses, magnetic fields and poles, and electromagnetic induction. 48K. J & S Software.

Magnum Isolator, ISO-17* Four isolated channels, each quad-filtered, provide isolation between processor and peripherals and also provide isolation from outside interference. The system includes integral heavy-duty spike suppression for added protection from lightning and heavy-equipment voltage kickback. Recommended for extremely hostile industrial environment or laboratories using very sensitive instrumentation. Electronic Specialists, Inc.

Magstik* A joystick game controller, manufactured for Apple and IBM computers. It features magnets which are housed in the joystick case to self-center it. This particular feature imparts a smoother feel to the joystick and provides more durability than with spring-centered joysticks. During testing, the magnet was removed and found to be quite powerful; this is a cause for concern, as magnetic media such as program disks and data disks should not be exposed to powerful magnets. If the user accidentally rests the base of the joystick on a disk, problems could arise. The joystick is equipped with two buttons that are required in some game situations, and with certain graphics programs to draw lines and to position shapes. The buttons are uncomfortably close together. Unless we receive some assurance from the manufacturer that disks and other magnetic storage media will not be damaged by the magnets (and some adjustment is made to the proximity of the buttons), this joystick cannot be recommended. Tech Designs, Inc.

Mail List Manager* Keep track of all your addresses and phone numbers with ease on the Apple III. The manager can hold up to five lines of information and retrieve the names and address in a variety of ways. Some of the features include storing, sorting, editing, and printing of letter quality labels. The sorting can be done any way you please, on any field (part of the entry), or by setting up ID codes within the entry. Apple Computer, Inc.

Mail List Manager Interface* Used to quickly compile letters with addresses. Mail List Manager Interface works with Word Juggler* and the Apple III to simplify mailing labels, letter composition (with addresses), and general correspondence. Quark Engineering.

Mail List Package* A versatile mailing list that allows you to store up to 700 entries per disk with no limit on the number of disks used. The program defines eight categories for names, addresses, company names, cities, states, zips, telephone numbers, and categories. The category entry can be used for searching by specific type of entry. Sorting may be done with any field as the key. 32K. High Technolgy, Inc.

Mail List Software See Addagram; Address Book, The; Apple Post; Apple Sack 5—Mail Sack; Complete Mailing Label and Filing System (Version 2), The; Digisong Paks; Disk Mailing List; EasyMailer; FCM; First Edition; Label Maker; Label Splitter; Letter Post; Little Jiffie; Magic Mailer; Mail List Manager Interface; Mail List Package; Mail List 3.0; Mail Mate; Mailer; Mailing Label and Filing System, The; Mailing Label and Filing System Adjunct, The; Mailing Label and Filing System Supplement, The; Mailing List; Mailing List Database; Mailing List Management; Mailing List Program; Mailing/Phone List; Mailmaster; MailMerge; Mail/Phone List; Mailroom; Mailroom, The; Master Mailing List; Mega-Mail; N.E.X.U.S.,The; Parent Reporting; Political Party Mailing List; Professional Mailing System; School Mailer; Small Group Roster.

Mail List 3.0* An upgrade of the popular Mail List 2.2* with added editing capabilities. Up to 2500 names can be stored on one disk, depending on your drive. Sorts can be done by zip codes or last names. Search capabilities by name, zip codes, or designated keywords.

Mail Mate* A combination mailing list program and form letter merge application. When used in conjunction with Magic Window* Word Processing, it can be used to produce personalized form letters. Includes fast sort, 360 possible codes for searches, and multiple option searches. Evolution Software, Inc.

Mailer* A mailing list program that is written in Pascal and comes with the source listing, making it user modifiable. In stock form, it includes searches and printing in alphabetical, state, or zip code order. Apple Pascal required. PCD Systems.

Mailing Label and Filing System Adjunct, The* The enhancement of the Mailing Label and Filing System* increases your options for using and creating lists. This addition will add the capabilities of label printing in alpha or zip code order, sorts on up to fifty-two different codes, and features formatted phone and address lists. Applesoft; 48K. Avant-Garde Creations.

Mailing Label and Filing System Supplement, The* This addition to the original system is a further enhancement of the Mailing Label and Filing System Adjunct*. The same features are included, with the addition of the capability to print out 80-column formatted phone and address lists. Applesoft; 48K. Avant-Garde Creations.

Mailing Label and Filing System, The* This mailing label program allows you to create your own files for labels. A binary sort feature locates any record in one or two seconds, and the COUNT/SORT feature allows you to access a distinct type of population within the file. 48K. Avant-Garde Creations.

Mailing List* Create and manage a mailing list of up to 450 names per disk. Includes search and sort features. 48K. Instant Software.

Mailing List Database* Create your own database of names and addresses which you can sort by whatever fields you want. You also can search for entries with certain keys for specialized mailings. Sort and search routines are written in Machine language for fast performance. 48K. Synergistic Software.

Mailing List Management* A small mailing list database for 8 to 12K machines. List holds up to eighty four-line entries on tape. Program includes SAVE and LOAD routines for data transfer. User can choose printer interface. 8K to 12K. Charles Mann & Associates.

Mailing List Program* A standard mailing list program with full editing features of add, change and delete. You can store up to 700 entries and access each by name, address, city, state, and zip. The program allows up to ten different categories for specific division. Educational Activities, Inc.

Mailing List Program* A program that lives up to its name. It can be used for labels or listing, search/sort on any of six fields, sorts phone numbers by last name, and more. Search and sort routines are in Machine language for fast processing. Software Technology for Computers.

Mailing/Phone List* A program that allows you to store up to 2700 entries per disk with the 8050 drive. Information includes name, company name and division, address, city, state, zip, phone, and notes. Search by name or zip. 3.2 or 3.3 DOS. Computer House Div/FLC, Inc.

Mailmaster* A mailing list program with variable width and length labels. Place up to 500 entries on each disk. Includes selective searching and printing of entries. Advanced Data Systems.

MailMerge* MailMerge is a interlocking merge-print option for WordStar*. It is a powerful multi-purpose file-merging program which, when used with WordStar, accomplishes complex word processing tasks, including personalized form letters, invoices, mailing labels, and "boilerplate" legal documents from many different standard paragraphs. MicroPro International.

Mail/Phone List* Create a mailing or phone list which can be used to print labels. You can print out specific subsets of your list such as names beginning with "T" or specific zip codes. Program can sort by zip codes to help you take advantage of bulk rates. Golway Computer Enterprises.

Mailroom* A mail management system which can help you get out your newsletter or manage your club lists. Add, change, or delete entries; sort in alphabetical or numerical order or by using the two code fields provided. 48K. Monument Computer Service.

Mailroom, The* You can store up to 750 names and addresses. The print option includes one, two, or three labels on each page. The sort can be done on any one of twelve different items. 48K. Continental Software.

Main Memory Refers to any device which can store information and allow it to be retrieved when needed. The Apple relies primarily on random access memory (RAM), read-only memory (ROM), diskettes, cassettes and hard disks. Memory, by itself, is usually a reference to RAM. This is the general purpose, erasable, and reusable memory located inside the Apple.

ROM (Read-Only Memory) contains fixed data, usually programs such as the Apple cassette BASIC, Autostart (Apple II+, IIe), and System Monitor (q.v.) routines. The ROM contains the fundamental machine language programs to run the various devices attached to the Apple such as monitor, printer, cassettes, disk drive, etc. ROM and RAM together make up the internal memory or main memory of the Apple or any other computer.

Compare this to external memory—such as cassette, diskette, and hard disk—which involve mechanical motion to retrieve data and are thus hundreds or thousands of times slower than internal memory. Data in internal memory is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT).

If data has been created, it can be written out to external memory without a READ first. And if data read in from external memory has not been modified, there is no need to write it back out since the original copy is still there.

While external memory is very slow relative to internal memory, it also has advantages. It is much cheaper per character of data stored on-line (available for processing without manual intervention). In addition, the ability to store external memory data off-line (such as diskettes or cassettes in a box) allows essentially unlimited storage of data. This, of course, requires a manual step of inserting the diskette/cassette/disk before the data can be loaded into the internal memory for processing. See Virtual Memory; RAM Disk; Spool; Bank Switching; Map Memory; Memory Address; Memory Segment; Bubble Memory; RAM Memory Card; and Diskette Format.

Maintenance, Diskette File management or diskette maintenance are terms that describe keeping track of files on diskettes. This includes creating them, finding them by name, ensuring that adequate free space is available on the diskette, maintaining backups, and deleting files that are no longer needed. These functions are supported by the various DOS functions, but require thoughtful planning by the user to insure proper results.

Some DataBase Management (DBM) systems attempt to automate part of the work of keeping track of files and diskettes. Some DBM systems maintain files of control and tracking data on other files and diskettes, and may provide alternatives to DOS functions.

Maintenance of the Apple The principal source of repair work for your Apple is your local dealer. The level of service will often depend upon the package you purchased initially. Apple Computer, Inc. requires that all its dealers who maintain service departments service Apples without regard to the place of original purchase. It is, though, a good idea to develop a continuing relationship with a local dealer in whom you have confidence. See also Sorbus*.

MAKE Subdirectory Command. An option that is available to Apple III users through the File Menu on the Utilities diskette. This program is used by pressing the M key while the File Handling Command Menu is being displayed. A subdirectory must be created with this command (prior to placing any files in the subdirectory). When this command is run, the user types the pathname sequence which will be used to access the subdirectory. This pathname sequence might look like the following:

/FINANCE/CAPITAL ITEMS/DEPRECIATION

FINANCE is the volume name.

CAPITAL is the subdirectory name.

DEPRECIATION is the local name given to a file.

The subdirectory is first created by typing

/FINANCE/DEPRECIATION

then pressing RETURN. The system sets up the subdirectory and asks the user for the number of files to be reserved in the subdirectory. The default is twenty-five files. The user can specify five or twelve. Once the number of files has been set aside, the name of each file to be placed in the directory is specified. These can be files already on the disk, files to be written to the disk, or files to be transferred from another disk.

Make a Monster* Fantastic graphics keep children interested for hours as they learn the fundamentals of fractions. By answering problems correctly, they keep the fire burning under the pot; the pot will display a huge and colorful monster once the quiz has been completed. 32K. Last.

Make a Tune* A fun musical program. You create your own tunes while the program displays a light show when the tune plays. You don't have to know a thing about music to do this. Merely choose high or low notes, slow or fast tempos, and the program will create a tune for you. 32K. Edutech Corp.

MAKE FILE This is a CP/M term associated with BDOS and with moving files from a disk drive to the computer's memory. This term describes a process similar to the READ command in Apple DOS. BDOS first OPENS the file then MAKES the file in the computer memory.

Malum II... Imperial Roman Programmable Computer* A Latin based interpreter that is similar to BASIC. Takes the Latin language equivalent of BASIC commands. Two programs come with the disk. Documentation manual is supplied. Tape 'n Text-Williamsville Publications.

Mammals* Distinguishes mammals from other animals, discussing four main differences. Includes a game that tests the concepts learned. Disk or cassette. Right On Programs.

MAN MANual Integer BASIC Command. Turns off the AUTO (q.v.) line numbering command.

Management of Files Diskette Maintenance. File management, or diskette maintenance, describes keeping track of files on diskettes. See Maintenance, Diskette.

Management Software Computer Models for Management Science; Conjob; Datebook II; Decision Master; Demo Package; Depreciation/Critical Path/-Profit Analysis; Desktop/Plan II; Disclosure Statement; Effective — Series of Programs for the Manager; Financial Analysis Package(FAP); General Ledger (various vendors); Job Control System; Job/Costing System; Krogh; Landlord, The; Maps/WP 6502; Medical Clinic; Money Decisions; Office manager; Project Boss; Project Control and Reporting (CORE); Project Management Group; Project Planning and Budgeting; Project Schedule Analysis I; Property Management; Quikdirt—Capital Budgeting; Quikdirt—Production Scheduling; Quikdirt—Transportation Planning; Real-Soft; Record Manager; Rental Manger, The; Resturant Profit Analysis; Routeplanner; Sales Order Entry III; Screen Director; Section 79; Service Charge Analysis and Pricing Model; Should You Incorporate?; Sir Isaac's

Yield Calculator; Smart; Smart Analyst and Graphics Package, The; Speed Stat; Split Dollar.

Management System in Numbers and Operations* A program that uses "criterion referenced testing" by means of sixty tests to measure skills. Each of the tests can be given in groups or individually. An optically-scanned card is the testing medium. The computer scores student cards singly or in batches and in many areas, serves as "teacher's aide." Helps identify students with similar needs. Zweig Associates.

Managing Your Time* Helps you organize your time by pointing out your time-wasting habits and the means to change those habits. There is a utility that lets you develop a daily schedule and gives you a printout. Mesa Research.

Mantissa The decimal part of a common logarithm. See Number Format.

Manual A process done by hand, and neither automated nor programmed.

Manual A reference book, booklet, or other document.

Manual Rack* This extended black plastic manual rack has separate spaces to allow easy access to six manuals. Nat Hellman III, Inc.

Map, Memory. A diagram of the memory address locations used by various parts of the program and/or operating system. For a 48K system (Apple II/II+), the map is as follows:

Highest RAM memory address: (DOS not installed)
#49151 ($BFFF)

HIMEM with DOS:
38399 ($9510)

Applesoft strings start at HIMEM and build down

High-resolution graphics (page 2)
16384 ($4000) to 124576 ($6000)

High-resolution graphics (page 1)
8192 ($2000) to 16383 ($3FFF)

Applesoft sets LOMEM at 2048 ($0800).

Applesoft program lines build up from this point, and push LOMEN up. Numeric variables start at LOMEM and build up.

From the above discussion, it can be seen that, even without using high-resolution graphics, it would be possible (with a very large program), to overlap the area used by numeric variables and the area used by string variables. When this situation is approached during the RUNning of a program, it may appear to halt for a time without any action of the user, and then go on. During this period a process called "housekeeping" (q.v.) occurs.

MAPS/WP 6502* A system for small businesses which provides increased capability for your Apple. It will handle word processing, database management, mail lists, and many more business applications. A few of the features are 80- and 40-column display compatibility, block and column move and copy, conditional sorts, and schedule management. Includes the plug-in board, program disks, and a manual. Electronic Information Systems.

Marching Band Database* Two programs to control information. One tracks band members and their uniform numbers, hat numbers, grades, sections, bus numbers, and instruments. The other tracks instruments within the department. It can be used for travel inventories and home inventories. Both programs come with scan, sort, and print routines. Aurora Systems, Inc.

Mark I Epson Reinker* A clip-on unit for re-inking Epson ribbons. Continuous re-inking takes place, but could be a problem if the printer is left idling for long periods. In this case a saturated spot occurs—ultimately, appearing as a dark spot on your printout. SAS Electronics.

Mark II Epson Reinker* A re-inking machine, which economically re-inks Epson MX-80/100 ribbons. In about twenty minutes to one hour (depending on the condition of your ribbon), you're ready for a fresh start. It is recommended that the ribbon sit for several hours to allow the ink to fully absorb and become even. SAS Electronics.

Market Advisor* Enter, store, and maintain investment portfolio information with this program. Features include capabilities to analyze gains, losses and fees paid to brokers. Applesoft in ROM; 80-column printer. Monument Computer Service.

Market Charter* A program that generates charts providing stock and commodity performance analysis. Features include high/low/close charts, several volume and comparison charts, and a file maintenance program for easy updating and editing of your database. RTR Software, Inc.

Market Tracker* A collection of technical indicators that determine stock market trends and make recommendations. Works with Stock Tracker (sold separately) to make recommendations on securities. Includes Market Grapher that generates graph point or bar graphs when user has some experience with graph analysis. 48K; printer. H & H Trading.

Marquee* Prints messages across the screen from right to left. 32K. Indian Head Software.

Mask The process of hiding the contents of the memory locations associated with the current screen display from the user. See CALL-868.

Master Diagnostics* A package that allows you to run a number of tests on your Apple Computer; there are separate versions for the Apple II/II+ and the Apple IIe. This program is menu-driven and in all but a few cases, there are warnings if you are about to cause damage to the program diskette by selecting a default value. The program will run the following tests: motherboard ROM test, Applesoft or Integer card, parallel card test (you must know in which slot this card is inserted), RAM test, disk drive analysis, Micromodem II (for the DC Hayes Micromodem), and the monitor or TV/RF-modulator which you are using for CRT display.

The RAM diagnostic test will do a one-pass test, which takes about 3 ½ minutes to run, testing each RAM location in turn and issuing a CTRL-G ("beep!") for a successful test. The RAM section will also do an automatic repeat test, which is useful in trying to locate an intermittent failure.

Under the disk drive analysis section, you may check the READ/WRITE function, the disk speed, the write-protect switch, and perform a head-cleaning routine. This package is especially useful for the disk-speed check, as you can check either disk drive, and the display will show you exactly how far from the desired 300 rpm your disk drive is currently spinning.

The monitor tests allow you to run a test pattern, text page alignment, color tests, and check of the game paddles and speaker. The monitor tests, especially the yoke alignment, require that the interior of the monitor be exposed. Since there is extemely high, potentially fatal, voltage on the CRT anode, it is strongly advised that you attempt the adjustments only if you are a competent technician.

Master Diagnostics also comes packaged as Master Diagnostics+, which includes the necessary supplies for routine cleaning of your system disk head cleaning diskette, CRT screen cleaner, computer housing cleaner, and wands covered with chamois which will allow cleaning the cracks in between the keys on the keyboard. All versions of the package come with a complete directions manual and values recommended for the various tests. Nikrom Technical Products, Inc.

Master Diagnostics IIe* Master Diagnostics for the Apple IIe is a program that tests the computer system's hardware and reports the results of each test on the screen. This program checks the computer's ROM, its RAM, the Apple 80-column card, the disk drive, the Micromodem II, and the video display monitor. The tests are selected from a menu. The ROM tests are run on all ROM sections. If an error or problem is found, the screen display indicates which ROM sector must be replaced. The 80-column card test runs a display of all of the keys eight times in sequential order. The RAM tests may be performed on onboard RAM or auxiliary RAM. Tests may be automatic, manual, or continuous. If an error is found, its hexadecimal address is displayed and the difference between data written and data read is printed on the screen. Disk drive tests include a read/write test, a disk speed calibration test, a write-protect switch test, and a head cleaning utility. The Micromodem II self-test is made with the microcoupler detached. The monitor tests including skewing, a color test pattern, a text page test, and a yoke alignment test. Routines are also available to test paddle and sound response. The programmer diagnoses many problems which might arise. The manual is complete and contains a very brief description of computer and disk drive maintenance. Unless the user is qualified to make major repairs, an authorized dealer should be used to make all repairs with the exception of disk drive speed adjustment. Nikrom Technical Products.

Master Diskettes In CP/M and DOS, applies to diskettes which contain the operating system and which automatically load the operating system into the computer when they are booted.

Master Mailing List* Uses almost all commercial labels to print out standard mailing labels. Each label includes four lines for data plus one for user codes. Creative Discount Software.

Master Menu See Menu.

Mastering the Parts of Speech* The programs cover forty-two skill sheets on verbs, nouns, adjectives, adverbs, conjunctions, and other parts of speech. SVE—Society For Visual Education, Inc.

MasterPlanner* An advanced version of PlannerCalc* with more options, making it more flexible. Includes the ability to skip lines which might facilitate calculations, the ability to save parts of a model, and merge two models. Files are interchangeable with PlannerCalc*, enabling a user to use the less expensive PlannerCalc* and move up to MasterPlanner when his needs become more sophisticated. Z-80; 16K. Comshare Target Software, Inc.

Mastertype* Learn to type while playing a game. This is how it works: your home base is being attacked by enemy words and, in order to deflect these words, you must type them in very quickly—so quickly, in fact, that you don't have time to look at the keyboard. The Mastertype disk comes with seventeen lessons plus an extra one that you can program yourself. 32K. Mastertype.

MAT BASIC Function. A function, available in some versions of BASIC, that is not available on the Apple. The program lines to accomplish the function for an array (q.v.) must be done with FOR...NEXT loops (q.v.).

MAT Make A Test* A menu-driven program used to create and store tests in true/false, multiple-choice, short answer, or essay form. Questions may be picked to vary entries in each exam. Detailed documentation is included. 48K; printer. Clemson University.

Mat Man* More than twenty-five modes are available for matrix manipulation with user-specified names and dimensions. Documentation includes mathematics and engineering applications and instructions on how to customize the program (delete or add modes). Disk. Smart Ware.

Matching and Using Numbers* A program that helps students learn the matching of numbers with graphics symbols. Includes three levels of difficulty; recommended for first graders. Disk or cassette. Right On Programs.

Matching Geometric Figures* Student is asked to match geometric figures that face different directions. Improves students concentration. Right On Programs.

Mate-I* A totally compatible 5 ¼ inch floppy disk drive for the Apple II. Memory capacity and track formatting are identical to the Apple's, so no modification of software is necessary. American Mitac.

Math* Lets you do math operations while editing a document in WordStar*. 48K; requires CP/M 2.3, WordStar* 3.0, and Z-80. Digital Marketing.

Math Challenger* Young children can learn the fundamentals of arithmetic through use of graphics and sound effects (four levels of difficulty are available). 8K. Firefly Computing.

Math Concepts* Introduces the young student to elementary math. Prime numbers, odd-even, and place value are featured. Levels of difficulty increase. 48K. Hartley Courseware Inc.

Math Facts Games-I* Play games while increasing your ability to perform calculations in addition, subtraction, multiplication, and division. Intended for kids between second and sixth grade; consists of four programs. Disk or cassette. Bertamax, Inc.

Math Ideas with Base Ten Blocks* Helps with addition, subtraction, multiplication, division, counting, comparing, and extends the use of base ten blocks through strong graphics display of place value materials. 48K. Southwest Edpsych Services, Inc.

Math Machine, The* Includes arithmetic skills taught in kindergarten through the sixth grade. Excellent for students who require remedial assistance and also gifted preschool children; step by step approach to meet each child's need. Color graphics and sound; manual; 48K. Southwest Edpsych Services, Inc.

Math on Computers by Joanne Benton* A series of programs that presents mathematical information in a way that is useful for students ranging from elementary level to high school. While the documentation recommends that the Factoring Whole Numbers set is "appropriate for upper elementary and junior high school, and for review or remedial work at the secondary or junior college level," there is valuable material for students of any age who are not math majors or math teachers.

Factoring Whole Numbers starts with factor pairs and "The Rectangle Game;" manipulative material (such as squares cut from paper or cardboard) are recommended, but drawn diagrams will also work well for the older student. You move on to the Pairs and Squares program, which discusses perfect squares and their relation to rectangles or non-perfect squares. Next comes Primes and Composites and a very effective demonstration of the Sieve of Erastosthenes. Moving up the scale, the student then learns to work with exponents. An advanced level program, at this point, discusses determining how many factors a number has based on the prime factorization method (learned at the beginning, in the factor pairs lesson). The lessons conclude with discussions of the highest common factor and the least common multiple. The finale is a two-to-six player game based upon all the concepts previously studied.

Lessons are also available on fractions, decimals, and a set of games called ArithMagic which can be used for fun by younger students, and as a way to discover mathematical theory for older ones. The pace is good, although there is no provision for "type-ahead" if the student knows the answer before the complete question is displayed on the screen. Some of the screens are displayed inversely. which may cause a skewing of the picture on some monitors. If a wrong answer is typed in, one chance is given to correct it before the proper answer is given and the lesson proceeds. Quality Educational Designs.

Math Sequences—Grades 1-8* A math program that helps the student understand pre-algebra math. Progress is self-paced. Included is a manager program so that a teacher can keep records on up to 100 students. A progress graph enables the instructor to pinpoint student problem areas. 48K. Milliken Publishing.

Math Strategy* A unique program for children to develop basic math skills. Learning techniques use the interrelationship between memory and eye movement, instruction is self-paced, and the student is encouraged to develop easily recalled mental images of equations and math tables. Quizzes and recall exercises are included and parents or teachers can develop their own lessons. For young adults. Apple Computer, Inc.

Math Tutor* A progressive testing program to enhance mathmatical skills. This program drills students on the four basic arithmetic functions, setting time imits to perform the calculations. Telephone Software Connection.

Math Word Problems* Children can discover techniques for solving word problems. Graphics aid provided in this six-program package. Mentor Software, Inc.

Math I* Covers pre-calculus level algebra, geometry, and trigonometry. Sliwa Enterprises.

Math I and Math II* A seventeen-program package that progressively increases arithmetic skills. Start with simple problem solving and work up to logical reasoning. 48K. California School For The Deaf.

Math II* Graphic presentation of geometry and trigonometry problems. Sliwa Enterprises.

Mathemagic* Not only does this program act like a super calculator, but it also gives the step-by-step process for each equation. International Software Marketing.

Mathematical Software Computer Laboratory Manual for Number Theory, A; Adding Machine; Advanced Mathematical Routines; Aesthemetry—Volume 1; Alpha Plot; Area Under a Curve; Arithmetic of Functions; Binomial Multiplication; Calculus I Disk; College Package; Complex Mathematics; Computer Laboratory Manual for Number Theory, A; Computer Math Games, Vols. I-5; Computer Underteacher; Con*putation; Decimals; Decimals and Percents; Derivative of Sine; Descriptive Statistics; Desk Calculator II; Division; Division Facts; Division with One-Digit Divisors; Easy Form; Edu-ware Fractions 3.0; Elementary Math Edu-Disk; Elementary Math Packages I and II; Elementary Math Classroom—Learning System—Fraction/Decimal Arithmetic; Elementary Math Classrooom—Learning System/Whole Number Arithmetic; Elementary Numerical Techniques for Ordinary Differential Equations; Elementary Volume I—Mathematics; Elementary Volume 4—Math/Science; Elementary Volume 8—Geometry; Elementary Volume 9—Geometry; Elementary Volume—10 Geometry; Essential Math I, II, III; Fact Sheets; Factoring; Factoring Whole Numbers; Fishing for Answers, Addition (Level I); Frac-Dec-Percent; Fractions; Haciendo Los Numeros; Integers/Equations; Intermediate Multiplication and Division; Invader Attack; Inventario1 Whole Numbers; Inventario2 Fractions; Inventario3 Decimals; Junior High Math Disk; Junior High Package; Lessons in Algebra; Limacons and their Areas; Make a Monster; Math; Math Challenger; Math Concepts; Math Facts Games—I; Math I; Math I and Math II; Math Ideas with Base Ten Blocks; Math II; Math Machine, The; Math Sequences—Grades 1-8; Mathematics; Mathematics—Volume I (Senior High); Mathematics—Volume 2 (Measurements); Mathematics—Volume 3 (Geometry); Mathematics Assessment/Prescriptive Edu-Disks (Complete Program); Mathematics Assessment/Prescriptive Edu-Disks (Grade Level Units); Mathematics Package—Grades 1 to 8; Mathgrid; Math/Spelling Strategy; Math Strategy; Matrix Manipulation; Measurement I; Mecc Science Vol.3; Metric Drill; Mult Facts;Multiplication & Division Fun; Multiplication and Division; Multiplication Facts Diagnostic; Multiplication Grafica; Multiploy; Multiterm One; N2 Market Analyzer; Number Series; Numerical Analysis; Off Center; Omnigraph; On the Average; Prescriptive Math Drill; Picture Library; Place Value; Plan 80; Planes; Plot II; Plotting Graphs for Line Printer; Plotting Graphs for Video Display; Poly Man; Primary Math Worksheet; Prime Factor; Problem Solving; Problem Solving in Everyday Math; Quadratic and the Parabola, The; Rational Function Grapher; Rayed-Wheel Printing Package; Real Number System, The; Reducing Fractions; Riemann Integral, The; Secondary Package; Senior High Math I Disk; Senior High Math II Disk; Sets; Simple Multiplication and Division; Soccer Math; Space Mouse; Space Scanner; Speed Facts; Super Math Package; Triangle Solutions; Trig/Circle Tangent; Whole Numbers; 3-D Surface Plotter; 10 Lessons in Algebra.

Mathematicas Rapidas 1* A math drill in addition and subtraction that's fun. This is the Spanish version of Fastmath 1*. Sound is included. For grade levels K through two. Applesoft. NTS Software.

Mathematicas Rapidas 2* Encourgages speed with math facts; this is a drill for two students, grade levels two through four. 32K; Applesoft. NTS Software.

Mathematics* A package of twelve disks that can improve math skills for students elementary school through junior high. Includes an objective-based curriculum that gives teachers full input to assignments and reviews of progress. Features such programs as Addition, Multiplication, Integers, Measurement Formulas, and Equations. A Teacher's Guide is an added attraction of this package. 48K. Milliken Publishing.

Mathematics Assessment/Prescriptive Edu-Disks (Complete Program)* A system for measuring math skills for grade levels one through seven. Reader's Digest Educational Division.

Mathematics Assessment/Prescriptive Edu-Disks (Grade Level Units)* Offers a system for measuring entry-level math skills for grade levels one through seven. Reader's Digest Educational Division.

Mathematics Package—Grades 1 to 8* Introduces and develops math concepts using ten different ideas. Decimal fractions, percents, measurements, geometry, and elementary algebra are some of the areas included. Features student record keeping, an escape function, color graphics, and sound. Compak, Inc.

Mathematics Problem Solving Edu-Disks* Two levels of six problem-solving strategies. 48K. Reader's Digest Educational Division.

Mathematics Series* A three-program set covering the following areas:

Numerical Analysis: hi-res plotting and automatic scaling. Plot the integral, derivative, determine the roots, find the maxima and minima, and list the integral value. 16K.

Matrix: determine the inverse and determinant of any matrix, solve any set of simultaneous linear equations. Thirty-five equation set: 32K. Fifty-five equation set: 48K.

3-D Surface Plotter: hi-res plots from any three-variable equation. Save and retrieve your plots. Black Hole gravitational curvature equations included in demos. Spectrum Software.

Mathematics—Volume 1 (Senior High)* A three-program set to plot equations on a grid: slope, polygraph, and polar. Minnesota Educational Computing Consortium.

Mathematics—Volume 2 (Measurements)* Test your knowledge of the concepts of the English measurement system. Areas covered include liquids, weights, time, and addition and subtraction quizzes. Minnesota Educational Computing Consortium.

Mathematics—Volume 3 (Geometry)* Includes: geometric shapes, perimeters, rectangle and square areas, parallelogram areas, and trapezoid and triangle areas. Minnesota Educational Computing Consortium.

Mathgrid* A ten-by-ten grid is used to help students learn zero to nine multiplication tables. They will also improve understanding of the x-y coordinate system. A total of forty questions are asked in each lesson. 16K. Ideatech Company.

Math/Spelling Strategy* A two-program package with an interesting approach to screen usage. Information is strategically displayed on the screen, which causes the student to actively look for the information. The result is better retention reinforcement. Both programs are intended for young children. 48K. Apple Computer, Inc.

Matrix See Array.

Matrix Disk Ephemerides (1700-2300)* Disk ephemerides make possible a new level of professional program. Pre-calculated planetary positions kept in tables like traditional ephemerides. With disk ephemerides, positions don't always have to be stored for each day. Interpolation routines can generate accurate positions based on positions stored at less frequent intervals. This enables disk ephemerides to produce a chart faster than earlier programs, an advantage in transit searching. A disadvantage is that they are available for only a given time period. The first release covers 1700-2300 with about a half minute of accuracy. The number of years that fit on a disk depend upon which system you are using; fifteen years is the average. Matrix Software.

Matrix Manipulation* A menu driven program that computes the determinant and solves any set of linearly-independent, simultaneous equations. Performs matrix multiplication, inversion, addition, and subtraction. Technical Software.

Matrix Professional Disk System* This program is designed to auto-load and run when the machine is turned on. It is the turnkey system for most of the other Matrix programs which come separatly. This program will help you assemble, store, locate, and update as many client or data files as you require. Each file may be accurate to a specified degree of planet accuracy and are accessible for use with other Matrix astrology programs. Features a screen dump, a sort, batch processing, data files of charts, client information files, and printouts in chart wheel form. 32K. Matrix Software.

Matter* A more advanced treatment of matter than the one presented in the manufacturer's other program, Matter and Energy*. It covers the molecular composition of matter and the various states it can assume. Also describes how the state of the molecules determines the phase of the matter as a whole. A comprehension testing game is also included. Disk or cassette. Right On Programs.

Matter* Teaches the symbols for the elements, and discusses the physical and chemical changes that they may undergo, including compounds, solutions, and mixtures. 48K. J & S Software.

Matter and Energy* An educational program designed to prompt thinking and questions about energy and matter and how they relate. A game is included for testing. Disk or cassette. Right On Programs.

MAXFILES DOS Command. When you boot DOS, memory space for three file buffers is set aside. Each active file requires 256 bytes of memory for an input buffer (from disk to memory) and 256 bytes of memory for an output buffer (from memory to disk.) because the speed of memory is so much greater than the operating speed of the disk drive. The default of three file buffers will allow a maximum of three files to be opened at any one time. If your program requires a lot of memory area but does not require accessing multiple files at one time, you may use the command with the following format:

```
(nnn) MAXFILES (x)
```

where (nnn) is the line number, preferably at the beginning of the program—certainly before any file is opened—and x is the number of active files (in this case one or two). On the other hand, if your program requires you to access many files concurrently, you may have as many as sixteen files open, in which case the command should be:

```
MAXFILES 16.
```

Maxiledger* A menu-driven General Ledger package that offers account matching, totalling, report production, and balancing. Features include account verification at entry time, a changes-in-financial-position report, divisional reporting capabilities, and automatic double entry. Compumax.

Maximum Active Drivers Apple III SOS allows up to twenty-eight device drivers to be active at any given time. These drivers can handle up to sixteen block devices and twelve character devices at once. Device drivers can be made active or inactive by accessing the Configuration Block and entering the letter A after the name of those drivers which are to be active drivers and the letter I after the names of those drivers which are to be inactive. Only active drivers are loaded as part of the system when it is booted.

Maximum Buffer Level When the Apple III computer is using the RS232C drivers, its input buffer can be set to a maximum of 223 characters and a minimum of 132 characters by setting the XON/-XOFF Protocol when Configuration Block parameters are being modified.

MBASIC A form of BASIC language available with CP/M for multiple user systems. This form of BASIC is not available at present on Apple systems.

MC Machine Code. Actual Machine language instructions, whether written directly in MC or resulting from translation of a source program.

MCAT 2.0* Creates a sorted master catalog saved on a binary file. Has global searh capability with List/Print, and provides for duplicate volume numbers. Quite fast. Highlands Computer Services.

MDBS.DMS/MDBS.DDL* A data base management system that can link various entries in the data base to other information in a specified way, and thus handles "what if" questions. Features include storage and retrieval of data; can be expanded to include logging of transactions, restructuring of the database, and query handling. MBASIC under CP/M; Z-80 card and Pascal card or 16K card; and two disk drives. Micro Data Systems, Inc.

Measurement I* Learn the English measurement system by testing yourself with fill-in-the-blanks or multiple choice questions. You can race your skills against the clock to help increase calculation speed. 32K. Indian Head Software.

MECC Apple Demonstration Disk* A demonstration disk of the programs offered by MECC diskettes. A variety of programs include tutorial, simulation, music, math, science, and many more. Optimized Systems Software.

MECC Science Vol. 3* A package of five educational programs designed to enhance the junior high school student's science awareness. Earthquakes teaches how to locate the center of an earthquake. Minerals tests students' ability to identify twenty common minerals. Ursa identifies the five north constellations, their relationship to the north star, and teaches how to tell time by the stars. Fish relates information on the circulatory system of mammals with two-chambered hearts. Odell Lake covers the relative size of six lake-dwelling fish. 48K. Creative Computing.

Mechanics* A program that simulates gravity in a series of demonstrations. These include planetary motion, vertical fall with and without air resistance, and the hunter-monkey paradox. Edutech.

Medalist-Continents* Students must buy clues in order to learn information about continents. Also available in presidents and states versions of the program. Hartley Courseware, Inc.

Media Modes of recording and storing information, are called media. The main medium for the Apple is diskette, but cassette, hard disk, RAM, ROM, and other devices are also used. Media are often classified as:

a) removable, such as diskettes, cassettes, and some hard disks or
b) fixed, such as most hard disks. Fixed media are not removeable from the device that drives them, so there is no ability to store additional data or backup copies off-line (outside the computing system) for insertion when needed. See also Memory.

Media Accessories See Filing System for Diskettes, and Scotch 3M Head Cleaning Kit.

Media Skills* A comprehensive system for teaching the card catalog for grade levels five to eight. The program includes tutorials on the three kinds of catalog cards, the Dewey Decimal System, locating information on catalog cards, locating cards in the catalog, and using call numbers to locate books. Short quizzes are placed throughout the program for reinforcement of what has been learned. A disk with four games based on the tutorials is included for further enhancement of concepts. 48K. Ties Minnesota School District.

Mediamix ETI(2)* Converts an IBM typewriter into a letter-quality printer, enabling the typewriter to function as a computer printer or a manual typewriter. Applied Creative Technology, Inc.

Medical Clinic* A system for a medical clinics to process information for many patients. It can keep track of many types of records and is geared formedical applications. The hardware requirements, along with an Apple III, are two disk drives and a 130-column printer. Monument Computer Service.

Medical Software Health; Health and Our Bodies; Health Maintenance Volume 1; Health Maintenance Volume 2; Health Aide; Human Body: An Overview, The; Human Skeleton, The; Ican; Metabolic Weight Loss and Control System; Nutricalc.

Mega-Mail* This is the mailing list for those who really want to target specific segments of their business or personal address database. With plenty of user-definable codes, you can search for and sort on almost any code. The program even includes current information on how you can use its capabilities to save on bulk mail rates and Zip Plus 4. Two 64K RAMCARDS, two disk drives, printer. Disk. Optimized Systems Software.

Megacard 64K Processor Card* This card provides a second processor for your Apple, enabling quicker program execution. The processor is an 8088 and operates at a full 5 MHz (four times faster than the 6502 of the Apple). Some of the additional features are external power supply, real-time clock, peripheral card support, and up to 8K of onboard EPROM (expandable to 32K when a larger EPROM becomes available). Full-speed multiprocessing is achieved with the 8088 processing the programs and the 6502 handling the input and output. Metamorphic Systems.

Megaflex Universal Flexible-Disk Controller* This disk controller card is used to interface eight-inch maxi drives, 5 ¼ inch mini-drives, or 3 inch micro drives to your Apple computer. All disks use the standard IBM 3740/System 34-style format, making the disks transportable to other systems. This driver consumes considerably less power than the standard driver for the Apple mini-disk drives, and will control up to four drives (four megabytes of storage). Sorrento Valley Associates.

Melodious Dictator* Teaches students to hear single line melodies and to note these on a traditional treble cleff staff. This program begins with a two-note pattern based on major and minor seconds and increases difficulty to seven-note patterns using harmonic intervals within the octave. First the student listens to a melody and then, noting the pitches on a staff, uses a graphic representation of a keyboard. 48K. Micro Music, Inc.

Memominder* Having trouble keeping track of messages and memos? Let Memominder and the Apple III help you. Organize memos by time, date, month, and year. It is also set up to handle messages for a number of people. Software Resources Computer Works, Inc.

Memory Any device which can store information and allow it to be retrieved when needed. The Apple relies primarily on random access memory (RAM), read-only memory (ROM), diskettes, cassettes, and hard disks. Memory, by itself, is usually a reference to RAM. This is the general purpose, erasable, and reusable memory located inside the Apple.

ROM (read-only memory) contains fixed data, usually programs such as the Apple's cassette BASIC ROMs and its ROM BIOS (BASIC Input/-Output System). The ROM BIOS contains the fundamental Machine language programs to run the various devices attached to the Apple (such as the monitor, printer, diskettes, cassettes, etc). ROM and RAM together make up the internal memory or main memory of the Apple, or any other computer.

Compare this with external memory—such as cassette, diskette, and hard disk—which involves mechanical motion to retrieve data and is thus hundreds or thousands of times slower than internal memory. Data in internal memory is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT).

If data has been created, it can be written out to external memory without a READ first. And, if data read in from external memory has not been modified, there is no need to write it back out since the original copy is still there.

While external memory is very slow relative to internal memory, it also has advantages. It is much cheaper per character of data stored on-line (available for processing without manual intervention). In addition, the ability to store external memory data off-line (such as diskettes or cassettes in a box) allows essentially unlimited storage of data. This, of course, requires a manual step of inserting the diskette/cassette/disk before the data can be loaded into the internal memory for processing. See Virtual Memory; RAM Disk, Spool; Bank Switching; Memory Map; Memory Addresses; Memory Segment; Bubble Memory; RAM Memory Card; and Diskette Format.

Memory—Amount Free BASIC. See FRE.

Memory, Change BASIC. See POKE.

Memory, Read Byte From BASIC. See PEEK.

Memory, Storage in Bytes Byte is a label for storage to hold one character (letter, digit, etc.) in computer memory, internal or diskette. Byte is abbreviated as B; in thousands, KB or simply K. (Actually, 1K = 1024 bytes, because this number is an even power of 2.)

Apple II/II+ have 48K (or 48KB) of internal memory; or 48,000 (to be precise, 48K = 4 X 1024 = 49m152 bytes). Apple IIe has 64K (64x1024=65536 bytes) of internal memory.

Memory Address A number or variable designating a location in memory. See Address.

Memory Boards See Vision-128, Legend S-card, Neptune board, Artsci Expand-a-Ram.

Memory Builder: Concentration* Play this educational game against an opponent, yourself, or the computer. The program is designed to improve attention span, memory, and concentration; uses letters and three-letter words. Program Design Inc.

Memory Card A card containing RAM or ROM memory to expand or enhance the computer's main memory. See Memory Expansion Cards and Memory Boards.

Memory Dump While in the system monitor (q.v.) you may examine the memory of the computer in several ways. If you type an address (in hexadecimal notation) following the * prompt and press RETURN, the contents of that address will be displayed, e.g., *30 will display:

```
0030-A0
```

If you type a period followed by an address before you press RETURN, the monitor will display the contents of memory from the last opened location ($30 in the above example) to the address you specified in the command. For example, *.3F will yield:

```
0031-00 FF AA 03 F0 FD
0038-1B FD 01 00 3C 00 3F 00
```

The actual contents of these memory locations will vary, depending upon the type of computer you are using; Apple II+ will not give the same results as the Apple IIe.

If you type both an opening address and an ending address by combining the two above commands, you will have dispayed a memory range. (If you specify too great a range for the screen capacity, some of your information will scroll off the top of the screen before you have had a chance to read it.) The maximum number of addresses which can be contained on the screen at one time is 184 (8 lines times 23 lines), with the last screen line reserved for the prompt. For example, *200.22F will yield:

```
0200-B2 B0 B0 AE B2 C6 8D
0208-31 00 A0 00 84 00 98 91
0210-00 C8 D0 FB E6 01 F0 0C
```

```
0218-A6 01 E0 C0 D0 F1 A2 D0
0220-86 01 D0 EB AD 82 C0 AD
0228-82 C0 20 84 FE 20 2F FB
```

The monitor will list up to eight hexadecimal values per line, but will start each line with the next address that's a multiple of 8, i.e., one that ends with an 8 or a 0. Therefore, there may not be the full eight values on some of your memory dump lines, as in the above example.

Memory Expansion Cards* Many memory expansion cards are available for the Apple computer. These easy-to-install boards give your system much more flexibility. They add between 16K to 256K of RAM to your system. Listed below are some of the boards available to the Apple user.

PRODUCT	VENDOR
Add-RAM	Advanced Logic Systems
AXP-16K-A Memory Expansion Board	Computer Technology Associates
AXP-32K-A Memory Expansion Board	Computer Technology Associates
Memory Expansion Cards	STB Systems Inc.
16K RAM Expansion Board	Andromeda Computer Systems
32K RAM Board	GS Computer Enterprises
64K RAM Board	GS Computer Enterprises
64KC RAM Card	Legend Industries Ltd.

Also see Memory Boards.

Memory Kits See Memory Boards.

Memory Management Commands (Apple III Business BASIC) During programming in Apple III Business BASIC, a number of memory management commands are available to the programmer. These commands are NEW, CLEAR, and FRE. NEW clears all programs, variables, and data from the computer's memory. CLEAR sets all numeric variable to zero and all string variables to null in the computer's memory. It also closes all open disk files and sets the stack and pointers to "clear" (zero). FRE provides the programmer with the amount of memory space available to him at the time he types PRINT FRE followed by RETURN.

Memory Management System* Allows relocation of DOS to a 16K RAM card which is placed in slot 0. This frees the upper 10.5K of memory for programs. However, POKEs, PEEKs, or CALLs must be recalculated since memory is now rearranged. With this system, the INIT command is destroyed and page 3 locations are no longer available (and are thereafter used as an interface area). 48K; 16K card, Applesoft or Integer ROM Card. Computer Data Services.

Memory Management Unit One of the custom VLSI (q.v.) chips in the Apple IIe, which implements a series of soft-switches (such as page 2 display, hi-res mode, store to expanded 80-column card, select bank [only 64K of RAM may be active at one time]); enables bank-switched RAM, read/write auxillary memory, auxillary stack and zero page, slot ROM for connector #3, and slot ROM in I/O space.

Memory Myth* Children as well as adults will enjoy this program that tests and develops memory skills. 32K. Micro Power and Light Co.

Memory Plus* This 16K memory board can be connected to your Apple II to provide more user memory. There is also a three-position switch which enables you to change to the standard 48K configuration, access an alternate monitor ROM, or use the extra memory. If you switch the extra memory off, the contents of the memory are still saved (it is only logically shut off). LEDs provide information as to the status of the switch. Bit 3 Computer Corp.

Memory Segment A continuous block of memory addresses, such as 0 to 16K.

Memory Test* Test your computer's memory. This program writes to a user-defined memory location, reads it, compares it, and prints if the location is bad. Computer Components, Inc.

Mendelian Genetics ("Genie")* Either the student or the teacher may determine genetic configurations, depending upon whether the program is operated in the test or experiment mode. The program will then run a simulation of genetic phenomenona, including such factors as sex-linkage, partial and full dominance, and lethality. Topics are addressed in separate teacher-directed units and a Text Manual is included for parallel instruction. COM Press.

Menu A menu is a screen display which lists a number of possible options and asks the user to select one. A selection is made by keying in an identifying number or letter, or positioning the cursor beside the desired item, using a light pen, etc. This may require either a branch or subroutine call to the code for the function. Alternately the program to carry out this function may be loaded into memory and executed.

Many applications packages use a system of multiple menus. A Master Menu lists the major functions allowed. Selection of an option on the Master Menu causes another menu to be displayed, indicating more detailed options for the selected function. This can be followed by even more detailed menus, and so on. Often completion of a function will cause re-display of the Master Menu. Such a system is called menu-driven.

Menu—Device The Apple III Device Handling Commands Menu will list all devices configured to the current system, if you enter the letter "L" from the keyboard.

Menu File The Apple III File Handling Commands Menu lists all of the files stored on a diskette if you enter the letter "L."

Menu Generator* Create menu-driven programs with this utility. No programming knowledge is required to set up prompts for easy use of your Apple. Helps direct inputs, peripherals, file manipulations, and many other functions. Crane Software, Inc.

Menu Planner* Plans as many as three meals a day for two weeks and prepares shopping lists for you. Just pick up the shopping list and head for the market! 48K. Homeware.

Menu II, The* Plan your meals with recipes and other cooking hints. Features are: a calorie counter, a sodium counter, menus for two week periods, printed shopping lists with comment space, and six meal classifications. 48K. C & H Video.

Menu-Driven See Menu.

MERGE BASIC Command. MERGE is used to combine two or more programs written in BASIC. The MERGE program is a part of the Renumber (q.v.) program found on the System Master disk which comes with the Apple system.

Load the program Renumber first. It will be located above HIMEM (q.v.) and will be available whenever needed. Load the first BASIC program; type &H. Then load the second program and type &M. The two programs will be merged with the lines in numerical order; if there are duplicated line numbers, the line from the HOLD program will be listed second. If this situation occurs, it will be necessary to run Renumber. If another program is to be merged, repeat the above process by entering &H.

MergeCalc* A menu-driven product that allows the user to merge up to fifteen files. It features the ability to add, edit, compute, and analyze material. 48K; 16 sector. Micro Decision System.

Merlin* An editor/Assembler for use with Apple II or Apple II+ computers. It requires a 16K RAM card or an Apple Language Card. (An 80-column card is optional.) Merlin may also be used on the Apple IIe computer. It consists of a number of modules: the Executive, the Editor, the Assembler, and the Symbol Table Generator. Merlin operates in two modes: the Executive Control Mode and the Editor Control Mode. The Assembler which is used in Merlin is an enhanced version of TED II+. It is much more powerful than Apple's mini-Assembler. Merlin enables you to define a series of Assembly language instructions in a single command called a Macro. The program is an editor/Assembler for the serious Assembly language programmer, but it is still easy enough for a novice programmer to use. Southwestern Data Systems.

Message A statement or code printed out or displayed on the screen (by a program) to let you know what is happening. Examples include prompts (when the program expects you to input something) or error messages (which tell you something about what has gone wrong).

Message Trio* A three-program package that displays various messages. The user may print characters that are crisp and clear, floating and flashing, or colored and bold-faced. Messages may be stored and recalled. 32K. Connecticut Information Systems Co.

Metabolic Weight Loss and Control System* A thorough analysis of urine gives the exact nutritional intake of each client. Corresponding diets may then be formulateded to correct any vitamin and/or mineral deficiencies. Diet menus may be created for those needing guidance to decrease caloric intake. 48K; printer. Professional Computer Systems.

Metric Drill* Convert English measurements to metric, match prefixes to their values, calculate length, mass, and capacity, and much more! 48K. Hartley Courseware, Inc.

Micro Composer* Turns your computer into a music machine. Uses a wide selection of Digisong Paks that allow easy entering, displaying, editing, and playing of music, with up to four different voices. Seven different tone colors are avilable. 32K cassette or 48K disk. Micro Music, Inc.

MICRO DSS/F (Decision Support System/Finance)* A complete financial planning package offering a unique protection system. Includes a remote-control slide changer mechanism which serves two purposes: it changes slides and has an embedded ROM in the slotted end. The program is written in Pascal language. Two disk drives. Addison-Wesley Publishing Co.

Micro Memo* Better than a dumb old string around your finger, Micro Memo will handle all the messages you want. Set it up for daily scheduling, to remind you of appointments and for many other memo tasks up to a year in advance. Stoneware, Inc.

Micro Mother Goose* Three arcade games for children, based on the Mother Goose stories. Each game has different levels of difficulty and all are very entertaining. Includes Lamb Scram, Splat, and London Bridge Out. 48K. Software Productions, Inc.

Micro Painter* Turns your computer into an electronic coloring book. You can generate many colorful patterns in twenty-one colors. Firefly Computing.

Micro Tax/Series* A software package with complete federal tax assistance. A facsimile of tax form 1040 is stored in the program for you to use. Calculations are done fast and easily from current tables provided by the program. All materials can be printed out at any time. Each part of the series reflects a different tax schedule for individual needs. Aardvark Software.

Micro-Atlas* A reliable substitute for a map. Figures out the distance between two points, as well as finding certain locations for you. The database contains 411 cities whose locations are figured out within a mile's accuracy. There are two programs here: 1) Location finds the longitude and latitude of a city and 2) Distance finds the straight-line distance for you. 48K; Columbia Software.

Microbomp* A package designed for the small manufacturer. To maintain control over your inventory, three files are set up: 1) a scheduling file, with information about production schedules; 2) a bill of material file, defining product structures; and 3) a descriptive file for each item. This is a user friendly package that lists to screen or printer; routines are available to modify entries. Inventory is sorted alphanumerically by part number. Here are some features: ABC analysis; Max/Min report; materials requirement planning report; and a Standard Stock Status Report that will tell you the value of your inventory at cost, retail, and discounted retail. Compumax.

Micro-Communicator* A software package that makes the Apple II or Apple II+ a communications device for the disabled. Since it requires no more than a TV, a single disk drive, and computer, it is inexpensive. A mouthstick is used to activate a key, consequentially causing messages to be displayed with a vocabulary exceeding 1600 words. Grover & Associates.

Microcomputer Accounting Applications* Intended for accounting students. Procedures and concepts that have been handled manually can be transformed into computer-processed methods and procedures. McGraw-Hill Book Company.

Microcomputer as a Teaching Tool, The* A combination of software and filmstrips is used to instruct teachers as to the potential for learning that microcomputers bring to the classroom. The program assumes no knowledge of computers at the start and will introduce you to all aspects of computing. Various methods of incorporating the computer into your particular teaching area are demonstrated, with short demonstrations on a selection of academic subject areas. 48K; DOS 3.3. Society for Visual Education, Inc.

Microcomputer Circuit Analysis* For those who need fast frequency response calculations of a circuit. The circuit analysis includes impedance or transfer impedance, linear voltage, resistors, capacitors, indicators, bipolar transistors, field-effect transistors, and operational amplifiers. Hayden Book Company.

Microcomputer Testing Program for Accounting: Systems and Procedures, Fourth Edition* Vocabulary and concepts of accounting can be tested. Multiple choice questions and individual student reports are offered in this package. Apple II disks. McGraw-Hill Book Company.

Microcomputer Use & Software Design No. 7884* For educators, a booklet filled with ways to introduce students to micros. Includes a glossary of terms. Milton Bradley Educational Software.

Microcomputer Workbook Courseware/Software* This is a cassette- or disk-based system to teach students about microcomputers and BASIC. The student is introduced to computing on the computer and learns BASIC in the same hands-on manner. The set includes lessons on arrays, graphics, and functions. 16K cassette and 32K disk. Sterling Swift Publishing Company.

*MICROCOMPUTING** *MICROCOMPUTING* is a monthly general interest computer magazine, geared to the computing novice. *Microcomputing Magazine*/Wayne Green Inc.

Micro-Courier* Instant mail transmission to Apple microcomputers. Complete programs, VisiCalc* reports, charts, and graphs can be sent over regular telephone lines to other Apple owners (day or night) taking advantage of evening telephone rates. Menu features are: an editor that can edit, create, and revise messages; receiving and storage of incoming mail on disk; a send/receive mode that dials a message recipient (and redials until answered); selection, display, printing of file messages. Microcom, Inc.

Micro-Deutsch* Twenty-four grammar lessons that cover a beginning German course: substitution transformation drills, item ordering, translations, and verb drills. The drill vocabulary is based on use-frequency lists. Good as a supplement to high school or college text books. 32K. Krell Software.

MicroFazer* MicroFazer is an inexpensive universal printer buffer (8K to 64K available). It attaches directly to the input port of IBM, Epson, and other printers. MicroFazer is available in five versions: parallel-to-parallel, parallel-to-serial, serial-to-serial, serial-to-parallel, and a special parallel-to-parallel model specially designed for the Epson printer. Quadram Corporation.

Microfinesse* Comparable to the MicroDSS/F* program, this program runs on Apple II under the Pascal operating system. The user is required to make a model and write a program that will describe the logic of the model. The result is the flexibility to do what you want. After the logic file is created, the user creates data files, after which calculations can be performed. Printer output is available and graphics capabilities are included in the package. Some financial functions are: discounted cash flow, depreciation, loan amortization, and tax calculations. When computing, numbers can be shifted left or right to move the decimal. The program also handles simultaneous equations and matrix operations. Two weaknesses of the program are poor documentation and the fact that the user must have a thorough understanding of the Pascal language and operating system. 16K card. Osborne/McGraw-Hill.

MicroLaw* An automatic and complete law office billing system, for a maximum of ninety-nine clients. Overdue accounts, services rendered, fee costs, appointments, and more, may be recalled upon request. Software Hows.

Microledger* A complete general ledger program that's part of a five program collection called Small Business Software*. It offers you a complete chart of accounts, a journal, the ability to post income and expenses, to run a trial balance, and a complete audit trail. Microledger also allows you to run a balance sheet and a profit and loss statement. Compumax.

Micromap II* A menu-driven program developed for those interested in cartography. Each map is drawn in 3-D, is fully colored, and displays various textures. Graphs and charts may also be designed to give an additional display of simulation terrains. 48K. Morgan-Fairfield Graphics.

MicroModem IIe* A total data communications system. The printed circuit board lets the computer communicate with a small computer, a large timesharing system, or lets the Apple II be accessed like a timesharing computer—one user at a time. Using BASIC programs, you can send and receive data by means of the MicroModem IIe. A Smartcom package is included which connects the Apple II to telephone lines, thus eliminating distortions associated with acoustic couplers. The system waits for dial tones, dials numbers, answers the phone, and hangs up when a transmission is completed. It also can store three telephone numbers and remembers the last one called. The MicroModem IIe effortlessly manages file transfers and accepts three Apple operating systems: DOS 3.3, CP/M, and Pascal. Hayes Microcomputer Products, Inc.

MicroModem II Disk* A twenty-two interrelated program communications system that has a wide capacity. Functions include dialing phone numbers and automatically answering them, giving a customized greeting, letting you operate a remote computer from your keyboard, sending anything that can be put on disk to or from a remote computer, making printouts, logging in and communicating with a mainframe, and making automatic transmissions without a person present at either end. This last feature is very economical because you can send data when rates are cheapest, and you can use it after regular business hours. First Software, Inc.

Micromouse* A device that serves the same function as a joystick or light pen, it looks like a small box with wheels and two buttons. The mouse gives the computer a better human interface and assists with the use of graphics and word processing. 3G Company, Inc.

Micro-Painter* Have fun with your imagination and the computer screen. Offers you twenty-one colors and patterns to fool around with. Datasoft, Inc.

Micropay* A modular accounts payable system for small business applications, designed to be used by a person who has little experience with microcomputers. The initial program guides the user in initializing the master file and his A/P transaction file. Data is entered using the second module that requests invoice number, vendor name and address, ledger account numbers to be debited or credited, number of the purchase order, and quantity and description of the item(s) ordered. Another program creates an A/P history file from master file data, and will write checks to accounts payable vendors based on your selection of dates or range of dates. Other programs may be used to update the master file, transmit data to the journal file, list files, and update them in case of errors. You may also use program modules to generate A/P reports for one or several dates, one or all vendors, and cash that you will need. Compumax.

Micropers* A two-system package that helps businesses manage personnel and calculate salaries. Allows for numerous data fields to be entered for thorough records. Paychecks are printed after final approval is given, W-2 forms are issued, and complete employee histories are accessible. Compumax.

Microprism* Microprism is a low cost printer with 75 cps operation, pin and friction feed, and data printing at 110 cps. It contains both RS-232 and parallel interfaces, and features data plot graphics. Integral Data Systems, Inc.

Microproducts MDS* The editor, Assembler, disassembler, and debugger are all simultaneously resident in memory, providing convenient and rapid production of Assembly language programs. Available on disk or on five EPROMS on a bank-switchable memory module. This is perhaps the most versatile and easiest to use Assembler package on the market. Microproducts.

Microrec* The accounts recievable counterpart to the Compumax Accounts Payable* system. There is a program to assist you in entering customer data such as name and addresses, invoice number and date, purchase order number, purchase amount, quantity and description of product, a waybill, and the ledger account number to credit and/or debit. A transaction file temporarily holds transaction records until a specified date when they are transferred to a permanent master file. The program will print invoices by date, by customer, and by aged trial balance. The user can create an optional journal file and, if also using Microledger, the actual and projected payment will be reflected in his trial balance. Compumax.

Microspeed* Quick running speed and double the amount of commands of Applesoft are available with this high-level language system. Some features include multi-dimensional arrays, string handling, hi- and lo-res graphics, turtlegraphics, and thirty-five floating point commands. Available on a peripheral board. Applied Analytics, Inc.

Microstar Stytem* This is a professional lighting control system for the Apple computer. It is menu-driven, simple to use, will drive most solid state dimmers, check all channels (up to sixty-five) to see if they are operating correctly, and has other features which make it a very useful tool for theaters or concert halls. It will even keep track of show titles or print cue sheets. Weststar Corp.

Micro-Telegram* Will let your Apple II access worldwide Western Union services. Consequently, you will be able to send and receive TWX/Telex messages and use all Infomaster reports (foreign exchange, gold futures, news, stock market). Comes with many useful menu-driven features. Microcom, Inc.

Microtutor * If you are not up on the latest programming language, but you want to utilize the capabilities of the computer for administering quizzes, this program will allow you to build your own tests. System requirements are an Apple II/II+ with 48K of memory and one disk drive with DOS 3.3. If you have two disk drives, you may leave the program disk in drive #1 and the initialzied data diskette in drive #2. The disk may be backed up using any copy program, such as Copy A on your System Master diskette. Microtutor is the test-building portion of the disk. Because there are a number of options for constructing your quizzes, you should read the Manual completely, taking the quiz as the "operator" rather than the "user," or even the "student," which may be confusing at first to someone who is familiar with computer jargon.

You are limited to twenty thirty-eight-character lines in a question before you must pause (to allow the student to read the entire screen), clear the screen, and then continue with the rest of the question. For this reason, long essays (requiring analysis before answering a multiple choice question) are not the most desirable format for the use of the program. With shorter questions, however, you may specify all the acceptable answer variations (e.g. 1 or one; Johnson, Lyndon Johnson, or Lyndon Baines Johnson); specify one response for a wrong answer and one for a correct answer; and include the number of attempts the student may be allowed and the number of points which are awarded for the correct answer. Locus Systems.

Microverter MVS-505 Video Modulator* This device will convert the Apple II's video signal into a modulated UHF signal for either color or black and white. Includes gain adjustment and video loop-through, allowing you to connect the computer to a monitor and a television at the same time. ATV Research.

MID$ Apple III Business BASIC Command. Instructs the computer to return (display or use) a given substring from within a given string expression currently in the computer's memory. If the user typed:

```
PRINT MID$ (“Sasquatch”,3)
```

the computer would print "quatch" on the screen. If the user typed:

```
PRINT MID$(“Sasquatch”,3.5)
```

the computer would return "squat."

MID$—BASIC Function MID$, when used as a function, returns the requested part of a given string. The format is:

<string variable> = MID$<x$>,<n>[<,m>]

<x$> may be any string expression.

<n> is an integer expression in the range 1 to 255.

<m> is an integer expression in the range 0 to 255.

The MID$ function returns a string of length <m> characters from <x$> starting with the <n>th character. If you leave out <m> or, if there are fewer than <m> characters to the right of the <n>th character, all rightmost characters beginning with the <n>th character are returned. If <m> is equal to zero, or if <n> is greater than LEN<x$>, then MID$ returns a null string.

See LEFT$ and RIGHT$.

MID$—BASIC Statement The MID$ statement allows operations on a portion of a string variable; usually the operation is a comparison, although it may also be a direct assignment. The format is:

<nnn> MID$ <x$>, <q>, <p>

where <x$> is the string variable name, <q> is the position in the string starting from the leftmost position, and <p> is the length of the substring desired. For example, if you assigned a value of "SOFT APPLE CIDER" to N$, then MID$ (N$,6,5,) would be APPLE. Within the original string, spaces count as characters, so the A of APPLE is the sixth character in the string, not the fifth.

Midpoint Rule and Trapezoidal Rule* Handles the midpoint and trapezoidal rules both graphically and numerically. Also allows the user to supply the lower limit and the upper limit of integration. 48K. Math Software.

Midpoints* Will tabulate positions of all midpoints of the zodiac, including Asc, MC, mean Node, Vertex, and O degrees Aries, and will sort midpoints in any modules you desire (45 degrees, 22.5 degrees, 72 degrees, and so forth). AGS Software.

Mill, The* Use this board to transform your 8-bit Apple II into a 16-bit simulation computer. You can run the 6502 processor and the 6809 at the same time. Stellation Two.

Mimic Speech Processor* An audio signal processing unit that will change a speech signal into a digital bit stream that can be sampled by the computer, stored, and played back. Features a data range of 9600 bits per second, high-quality speech and intelligibility, automated word recognition, two-tone telephone signal encoding and decoding, sound effects, rhythm generator, and practice aid for musicians. Mimic, Inc.

Mind-Memory Improvement Course-Step 1* A series of programs that are designed to increase skills in the areas of listening, study, and memorization. Disk or cassette. Teach Yourself by Computer (TYC) Software.

Mind-Memory Improvement Course-Step 2* A series of programs that are extensions of those found in Step 1. Disk or cassette. Teach Yourself by Computer (TYC) Software.

Mind-Step 1* An introductory course in memory techniques. Each lesson has been designed by psychologists and educators and is backed by readings, explanations, and a manual. 16K cassette; 48K disk. Teach Yourself by Computer (TYC) Software.

Mind-Step 2* An extension of Mind-Step 1 whose instructions include analysis and memorization of visual information and poetry, and developing good listening habits and textual material. 16K cassette; 48K disk. Teach Yourself by Computer (TYC) Software.

Mini-Assembler Within the system monitor (q.v.), there is a mini-Assembler, which allows the use of mnemonics (q.v.) to enter Assembly language coding. It does not however support symbolic labels as does a full-sized Assembler program. To enter the mini-Assembler, you must first be running Integer BASIC. Then enter CALL -151, and you will be in the monitor (* prompt); from there enter F666G (the GO command), and you will be in the mini-Assembler (! prompt). To return to the monitor, enter either $FF69G after the !, or press CTRL-RESET which will warm start BASIC; then enter CALL -151.

Mini Series* Three separate programs (sold individually) that work with business finances. Mini-Debt* calculates and solves debt repayment schedules; MuniRefund* solves escrows and advanced refunding bond issues; and MuniSizer* enhances the calculation abilities of MiniDebt* to include bond issue sizing and fund cash flow analysis and sizing. B.A. Nicholson & Co.

Minimum Buffer Level 132 characters is the minimum buffer level that may be specified when the Apple III user is modifying the configuration block of the RS-232C Driver's XON/XOFF protocol.

Mix and Match* A series of four games for all ages. Raise the Flag is a word guessing game; Animal asks the computer to guess the animal you are thinking of; Layer Cake has you carefully moving a cake from a small pan to a larger one; and in Mix and Match, you create all-new Muppet characters from many available parts. 48K. Apple Computer, Inc.

Mixed Program Lines To start a new program type:

NEW

This completely erases all lines now in BASIC's memory so if there's something you want to keep and haven't already stored on diskette, SAVE it first. If you don't erase the program in memory before starting on another, you will usually wind up with the unusable combination of mixed lines from your old and new programs.

Mnemonic A name or abbreviation which is intended to remind you of what it stands for, such as LAX for Load Accumulator into X register.

Mnemonics Abbreviations used to write an Assembly language program. A table of the mnemonics and what they stand for is shown below. See also Hexadecimal op codes.

MNEMONIC	MEANING
ADC	AdD memory to accumulator with Carry.
AND	AND memory with accumulator.
ASL	Accumulator Shift Left one bit.
BCC	Branch on Carry Clear.
BCS	Branch on Carry Set.
BEQ	Branch on result EQual to zero.
BIT	Test BITs in memory with accumulator.
BMI	Branch on result MInus.
BNE	Branch on result Not Equal to zero.
BPL	Branch on result PLus.
BRK	Force a BReaK
BVC	Branch on oVerflow Clear.
BVS	Branch on oVerflow Set.
CLC	CLear Carry flag.
CLD	CLear Decimal mode.
CLI	CLear Interrupt flag.
CLV	CLear oVerflow flag.
CMP	CoMPare memory and accumulator.
CPX	CoMPare memory and index X.
CPY	CoMPare memory and index Y.
DEC	DECrement memory by one.
DEX	DEcrement index X by one.
DEY	DEcrement index Y by one.
EOR	Exclusive OR memory with accumulator.
INC	INCrement memory by one.
INX	INcrement index X by one.
INY	INcrement index Y by one.
JMP	JuMP to a new location.
JSR	Jump to SubRoutine.
LDA	LoaD Accumulator with memory.
LDX	LoaD index X with memory.
LDY	LoaD index Y with memory.
LSR	Logical Shift Right one bit.
NOP	No OPeration.
ORA	"OR" memory with Accumulator.
PHA	PusH Accumulator on stack.
PHP	PusH Processor status on stack.
PLA	PuLl Accumulator from stack.
PLP	PuLl Processor status from stack
ROL	ROtate one bit Left.
ROR	ROtate one bit Right.
RTI	ReTurn from Interrupt.
RTS	ReTurn from Subroutine.
SBC	SuBtract memory from accumulator with Carry (borrow).
SEC	SEt Carry flag.
SED	SEt Decimal mode.

MNEMONIC	MEANING
SEI	SEt Interrupt disable status.
STA	STore Accumulator in memory.
STX	STore index X in memory.
STY	STore index Y in memory.
TAX	Transfer Accumulator to index X.
TAY	Transfer Accumulator to index Y.
TSX	Transfer Stack pointer to index X.
TXA	Transfer index X to Accumulator.
TXS	Transfer index X to Stack pointer.
TYA	Transfer index Y to Accumulator.

MOD BASIC Statement. In Integer BASIC (Apple II) the statement A MOD B will return the remainder when A is divided by B. To accomplish the same thing using Applesoft (Apple II or IIe), the following code must be used:

```
MOD(A) = INT ((A/B-INT(A/B))*B+.05)
              *SGN(A/B
```

Mode—Execution There are two modes of execution: immediate and deferred. In the immediate mode, an instruction must be typed in without a line number. When the RETURN key is pressed, the instruction is immediately executed. For example: PRINT 2 + 4 will result in 6 being displayed on the next line of the screen.

Instructions in the deferred mode are part of a program and therefore must have a line number at the beginning of the line containing the instruction. These instructions are executed only when the line of the program containing these instructions is RUN.

Mode Drills* A set of programs that identifies major, minor, and church modes by means of sight and sound drills. 48K; Micro Music, Inc.

Model 7500 Wire Wrap Board* This board comes with all bus lines labeled on both sides and will support standard wire wrap sockets or components. The ground line runs along the edges of the board. California Computer Systems.

Model 7520 Extender Board* Analysis and maintenance of your components will be easier on your Apple with this extender board, which raises the peripheral boards of your computer (and gets them out of the way). California Computer Systems.

Model 7590 Etch Board* Create a circuit board to fit your own needs by etching with ferric chloride. California Computer Systems.

Model 7712 Synchronous Serial Interface* Directly connect your computer to a mainframe computer, serial printer, or other serial device that requires high-speed synchronous modes. Accurate data transfer is insured at a variety of rates with a 2.4576 MHz crystal and frequency divider circuit. A power-down feature is included with the two 256 by 4-bit ROMs which contain the controller firmware. California Computer Systems.

Model 7720-01 A Parallel Interface* This parallel interface board is equipped with many features: programmable interrupts, power down ROM, 256-bytes ROM or RAM space available, two bi-directional, 8-bit buses for interface to peripherals, and more. California Computer Systems.

Model 7729-01 Centronics Printer Interface* This interface board can be connected to any of the peripheral slots (one through seven) on the Apple II to interface high-speed Centronics-type printers to your computer. Some of the features include an 8-bit data output bus, two handshake lines, printer reset output, and 4-bit status input. You can choose to replace the driver firmware with your own driver programs by replacing the standard ROMs with RAMs. California Computer Systems.

Modelwriter* A text editor with the additional features of recovering deleted characters, indenting automatically, and moving the cursor to any specified line within the file. 56K; CP/M. Digital Marketing.

Modem Modulator demodulator. A device to convert the digital voltage level signals of the computer to modulated (frequency or tune) signals for transmission over phone lines. Required at both ends of a phone line for telecommuications.

Modem Eliminator When a printer is connected to the Apple III computer via the RS-232 Port, a Modem eliminator must also be connected. This device consists of a short cable with a standard 25-pin connector attached to both ends of the cable.

Modem Magic 2.0* Permits easy up- and down-loading of text to and from remote computers. Use Modem Magic to transfer Integer, Applesoft, or BASIC programs. The savings from long distance tolls will quickly pay for the cost of this package. Rocky Mountain Software.

Modem Program* You can use this program to coordinate the operation of a dual thermometer and a modem for sounding an alarm or transmitting temperature data over the phone. Autodialing of up to three phone numbers may be cued by preset temperature or time values. Each probe will accommodate up to eight such autodial values. Designed to work with the Hayes Micromodem IIe*. Strawberry Tree Computers.

Modems See Hayes Stack Smartmodem and Hayes Smartmodem 1200.

Modes, Graphics—Apple III See Graphics Modes.

Modifiable Database, The* A data management system that can also perform expanded arithmetic and report functions. Includes a variety of features such as sort, file organization, report preparation, and protection. 48K. Synergistic Software.

Modifier Keys Keys on a computer keyboard which modify the operation or ASCII output of other keys on the keyboard are called modifier keys. On the Apple II and Apple II+ keyboard, the CTRL and the SHIFT keys are modifier keys. On the Apple IIe and the Apple III keyboard, the SHIFT key, CTRL key, the APLHA LOCK key (Apple III), CAPS LOCK key (Apple IIe), the Open Apple key, and the solid (Closed) Apple key are modifier keys.

Modulator The Sup'r Mod or another RF (Radio Frequency) modulator, connects inside the Apple case. The Sup'r Mod's small 4-pin plastic connector at the end of the four colored wires, fits over the three brass pins at the back of the card labeled "P1," with the black wire (ground) down. Attach the Sup'r Mod itself inside the Apple, and run the RCA plug-ended gray cable out the pop-out plugged hole in the back of the Apple. Or, run the four colored wires of the Sup'r Mod out the back, and mount the Sup'r Mod on the back of the Apple. The outside RCA plug fits into your computer/TV switch box. The iron "doughnuts" supplied with the modulator to reduce TV interference should be laced through with the various wires. Position or tape them so that they can't knock against fragile chips or parts when you move the Apple.

The purpose of the RF modulator is to convert (or modulate) the signals generated by the color card (which are correct for a monitor) to the type required by a home TV set (radio frequency).

Mole Concept, The* A series of questions dealing with the mole concept and writing chemical equations. Microphys Programs.

MON DOS Command to MONitor the disk action. The default mode is NOMON (q.v.); if you wish to see what is happening in your program, type (in the immediate mode):

```
MON C, I, O
```

where MON stands for MONitor, and C(ommands), I(nput), and O(utput) are the areas you wish to examine during the running of the program. At least one of these parameters must be specified or the MON command will be ignored, but you may have any one, two, or all three, and in any order. The parameters must be separated by commas.

MON C will print each DOS command (OPEN, READ, CLOSE, etc.) to the screen in addition to causing the disk drive to operate. MON I will print to the screen all information which is coming from the disk to memory; MON O will print to the screen all information which is going from memory to disk.

Money* A program that teaches, by means of examples, the importance of handling money wisely (addition, subtraction, multiplication and division). Right On Programs.

Money Decisions* A fully-documented program that assists business people in making logical financial and managerial decisions. Colorful charts and graphs allow presentations to be less technical for the novice user to understand. 64K. Eagle Software Publishing, Inc.

Moneybee I* A financial calculation tool that allows you to review investments over specific time periods. Features include adjustments for additions and withdrawals from portfolios, comparisons of alternative investments, evaluation of the effectiveness of an investment program, and record maintenance. Honeybee.

Moneybee IX* Allows you to create combinations of savings bonds, commodities, and stocks which will help you achieve your desired financial objectives. In addition, you may determine the true picture behind risk and return, and see how combinations will effect your family's investment future. 48K; dual-disk drives. Honeybee.

Monitor—Test Environment The System Monitor in the Apple is a program in ROM (q.v.). When you have entered the Monitor from BASIC (by typing CALL-151), you can examine the change in the contents of any memory location. You can write programs in Machine and Assembly languages (q.v.) which will be executed directly by the Apple 6502 microprocessor; you also can save data and programs onto cassette or disk and read them back into memory. The Monitor prompt (q.v.) is an asterisk (*) instead of the > for Integer BASIC, or the] for Applesoft BASIC. To reenter BASIC from the monitor, type 3D0G (if you are using Apple DOS), or press RESET (Apple II), or CTRL-RESET (Apple II+ or IIe).

Monitor, System Within the ROM chips of the Apple is a set of subroutines collectively called the System Monitor. These subroutines provide a standard interface to I/O devices, and include RDKEY, GETLN, and COUT (q.v.). From within the Monitor, you may examine the contents of memory, change any individual memory address, move data in memory, compare data in memory, examine and change register contents, "dump" the memory (q.v.), and enter Machine language programs.

Monitors, Color There are two types of color monitors available for use with computers: composite color and RGB. A composite color monitor employs a single-coded signal to produce the image on the screen. This signal contains information which synchronizes horizontal and vertical alignment, intensity, and color display. The RGB monitor employs either three or four signals to accomplish these tasks. The four-signal system uses a separate signal for red, green, and blue color. The fourth signal is the syncrhonization signal; a three-signal system combines the synchronization with one of the three color signals.

Monitors, Monochrome and Black/White Monochrome and black/white monitors display a single color on a black or dark background. The most popular monitors of this nature are black/white, green, and amber.

Color Monitor Chart

Manufacturer	Model	Type	Diagonal Size (in inches)	Pixel Resolution	Text Resolution
Amdek	Color I	Composite Color	13	260 by 300	40 by 24
	Color II	RGB	13	560 by 240	80 by 25
	Color II-A	RGB	13	560 by 240	80 by 25
	Color III	RGB	13	260 by 300	40 by 24
	Color IV	RGB	13	720 by 420	96 by 25
Computer Systems	VD/9	Composite Color	9	400 by 1024	80 by 25
	VD/12	Composite Color	12	400 by 1024	80 by 25
	VD/19	Composite Color	19	400 by 1024	80 by 24
Electrohome	ECM 1302-1	RGB	13	370 by 235	64 by 40
	ECM 1302-2	RGB	13	580 by 235	80 by 40
	ECM 1301	RGB	13	720 by 512	80 by 40
NEC Home Electronics	JC1203DH(A)	RGB	12	690 by 280	80 by 25
	JC1202DH(A)	RGB	12	690 by 280	80 by 25
Sanyo Business Systems	DMC 6013	Composite Color	13	NA	64 by 24
	DMC 6113	RGB	13	NA	80 by 24
Texas Instruments	PHA 4100	RGB	10	256 by 192	40 by 24
TSK Electronics (TAXAN)	RGB Vision I	RGB	12	NA	40/80 by 25
	RGB Vision II	RGB	12	NA	64/80 by 25
	RGB Vision III	RGB	12	NA	80 by 25
Zenith Data Systems	ZVM 134	RGM	13	680 by 460	80 by 255

Monochrome and Black/White Monitors

Manufacturer	Model	Type	Diagonal Size (in inches)	Pixel Resolution	Text Resolution
Amdex Corp.	V-300	Green	12	900 by 800	80 by 25
	V-300A	Amber	12	900 by 800	80 by 25
	V-310	Green	12	900 by 800	80 by 25
	V-310A	Amber	12	900 by 800	80 by 25
Apple Computer	Monitor II	Green	12	480 by 192	80 by 24
	Monitor III	Green or B/W	12	480 by 192	80 by 24
Computer Systems	VD/9	Green or Amber	9	400 by 1024	80 by 25
	VD/12	Green or Amber	12	400 by 1024	80 by 25
	VD/19	Green or Amber	19	400 by 1024	80 by 25
Electrohome	ECM 926	Green or B/W	9	NA	80 by 40
	ECM 1226	Green or B/W	12	NA	80 by 40
NEC Home Electronics	JB-1260(A)	Green	12	600 by 230	80 by 25
	JB-1201M(A)	Green	12	800 by 250	80 by 25
	JB-902M(A)	Green	9	700 by 230	80 by 25
Sanyo Business Systems	DM2012	B/W	12	NA	64 by 20
	DM2112	Green	12	NA	64 by 20
	VM4509	B/W	9	NA	80 by 24
	DM5109CX	Green	9	NA	80 by 24
	DM8012CX	B/W	12	NA	80 by 24
	DM8112CX	Green	12	NA	80 by 24
TSK Electronics (TAXAN)	KG-12N	Green	12	NA	80 by 25
	KG-12N-MN	Amber	12	NA	80 by 25
USI International	Pi-1	Green	9	560 by 240	80 by 24
	Pi-2	Green	12	560 by 240	80 by 24
	Pi-3	Amber	12	560 by 240	80 by 24
	Pi-4	Amber	9	560 by 240	80 by 24
Zenith Data System	ZVM121	Green	12	NA	80 by 25

Monty Plays Scrabble* A fun and interesting way to increase your vocabulary by tens of thousands of words. 16K. Ritam Corporation.

Moonlighter Tax Guide* An entirely screen-oriented program for small, part-time businesses. The introduction program makes use of the program Higher Text*. Totals and some basic depreciations are performed. Different files can be accessed through a catalogue-type command. No printer support is available. Shafer Software.

MopTown* A self-paced learning program that uses color and sound to create eleven different games. They all involve the Moppet characters and the town in which they live. A variety of available levels teach deductive reasoning, association, and the development of concepts. Features such games as Make My Twin, Moptown Parade, Moptown Clubhouse, Who's Different?, and Who's the Same?. Apple Computer, Inc.

Morloc's Tower* You do battle with Morloc throughout his complex tower filled with magic and treasures. Easy to learn; the challenge is to improve your score each time you play. Disk or cassette. Automated Simulations.

Morse Trainer* This utility sends and then displays five character code groups (random) for characters of your choice. A.B. Buscaglia.

Mortgage* A program that calculates and optimizes mortgage payments. United Software of America.

Mortgage Acceleration Program (MAP)* Used by many salespeople as an aid in creating presentations for potential clients. Through data gathering and the analysis program, personalized projections compilations make presentations more effective. RE/International Systems Corporation.

Mostly Basic Household Program Package* A package that includes Basic Diet, Digital Stopwatch, Message Taker, Medical Expense Record, Amortization Schedule, House Buying Guide, Tarot Card Reader, and three calculators. 48K. Howard W. Sams & Co.

Mostly Basic Scientific Program Package* A nice mix of seven useful and interesting programs, including Combination Lock, Word Board, Basic Telephone Dialer, Hex and Decimal Conversions, Constellation 10, Time Machine Clock, and The Sun. 48K. Howard W. Sams & Co.

Motherboard The main part of a circuit board in an electronic device. It is usually the largest board and has "slots" for smaller boards to plug into. See Board, Breadboard.

Motion* Designed for junior high school students, this program is concerned with topics in motion. Topics include gravity, acceleration, average speed, and Newton's Laws of Motion. 48K. J & S Software.

MOVE Monitor Command. You can copy a complete block of data from one location in memory to another by the use of the monitor MOVE command. You must specify the new starting location, and the range of memory to be copied, using the format:

```
dddd < ssss.eeeeM <RETURN>
```

where dddd is the hexadecimal destination address, ssss is the starting address of the block to be moved, and eeee is the ending address of the block to be moved; ssss and eeee are the addresses where the block is now. ssss and eeee must be separated by a period and the last character before the RETURN is pressed must be an M (for MOVE). See Memory Dump.

Move Cursor Down Code The ASCII screen control code which directs the Apple III computer to move the cursor down one line from its current position, is ASCII 10 enclosed in parentheses after a CHR$ expression in a program line. The line:

```
200 PRINT CHR$(10): PRINT "STOP"
```

would print out the word "STOP" one line further down on the screen.

Move Cursor Left Code The ASCII screen control code which moves the Apple III's cursor back space on the same line is CHR$(08).

Move Cursor Right Code The ASCII screen control code which moves the cursor right one space on the same line is CHR$(09).

Move Cursor Up Code The ASCII screen control code which moves the Apple III's cursor up one line from its current position during output is CHR$(11).

Move Pen Code When the Graphics Driver is in use on the Apple III, a number of screen control codes are available to the user. These codes must be expressed as ASCII characters and must be included in a program line. The ASCII code for moving the plotting pen to a new position is CHR$(26) followed by the X and Y coordinates of the new pen position.

MOVEREL In Apple III Business BASIC with the Graphics Module invoked, the cursor can be moved to another screen position relative to its current position by using MOVEREL. To move the cursor twelve positions to the right and up ten positions, the user would type the following from the immediate mode:

```
X=12:Y=10 PERFORM MOVEREL (%X,%Y)
```

MOVETO An Apple III Business BASIC Command with the Graphics Module invoked. This command causes the cursor to be moved to a specified X, Y position.

Moving the Cursor The cursor is the flashing square which appears on the screen to let you know where an action (such as typing in a character, deleting, inserting, etc.) will take place. The cursor moves to the right as you type, and backs up to the left when you press the left arrow. You may also move the cursor to edit material on the screen by pressing ESC-A, ESC-B, ESC-C, or ESC-D. In some programs, the position of the cursor is controlled with the I, J, K, and M keys. These keys form a diamond on the keyboard and serve as a mnemonic for the direction of cursor movement ("I" moves the cursor up, "J" moves the cursor left, etc.)

When editing directly from Applesoft, it is necessary to position the cursor over the character(s) you wish to change. If you type additional information, it will replace the information originally on the screen. If you have left the program line you wish to change (by having pressed RETURN and gone on to the next or later program lines) you will need to position the cursor over the first character of the line (meaning the first digit of the line number). Copy over the material which is correct by pressing the right arrow until you reach the position of the character you wish to change. Make the change by typing in the new character, then copy the rest of the program line with the right arrow before pressing RETURN.

When using the Apple IIe, you can move the cursor up or down the screen by using the up or down arrow keys on the lower right of the keyboard. This moves the cursor without erasing anything that you have already typed.

MP/M An operating system similar to CP/M except that it's for multiple users.

MPU Micro Processor Unit. The actual chip containing the processor (a 6502 for the Apple).

MSB Most Significant Bit.

Muffin A program found on the System Master diskette supplied with the Apple II+ systems. It is designed to convert programs from DOS 3.2 format to DOS 3.3. At the time of the introduction of DOS 3.3, it was an extremely useful utility; at present, though, there are almost no DOS 3.2 programs remaining that have not been converted to the newer format.

Mult Facts* Perfect your multiplication skills by practicing individual number tables. 32K. The Computer Connection, Ltd.

Multifield Information System/Utilities Disk* A menu-driven database that features easy file/field defining, editing, search, sort, and more. Easy file combining to create labels and letters for mail merging. Requires 32K or 48K with Applesoft ROM and at least one disk drive. The Computer Emporium.

Multi-Loader* After you input as many as fifty A-1 natal charts at a time, the program will tell you how to enter data, easily correct mistakes, and will show you how much storage space is left. AGS Software.

Multi-Message* Send messages to any TV screen connected to your Apple. Up to ten sets of messages can be strung together and colorful patterns can be placed between the sent portions. Connecticut Information Systems Co.

Multimusic* A special set of Machine language subroutines make listening to the harmonies of a Bach chorale possible. A full seven-octave range gives you a lot of flexibility. You also can view the composition as it is played. Included in this package is a text editor, standard note-name compiler, instructions, and examples. 32K. Sonora Computing.

Multipix* This program uses special graphics and questions to present the principles of multiplication to elementary school students in grades two through four. A minimum of 32K of RAM is required on Apple II, II+, or Apple IIe computers. DOS 3.2 or DOS 3.3. NTS Software.

Multiplan* Without requiring much programming savvy or skills, the electronic spreadsheet was recognized as a program that could be mastered simply and still provide sophisticated results when applied to the pencil-gnawing repetitiveness of daily bookkeeping and financial planning. After 1978, new brands of electronic spreadsheets (only slightly veiled in their similarity to the original VisiCalc*) were rushed out for sale. With each "Visiclone" trying to be a little better than its predecessor, Multiplan is one of the latest and more successful attempts to go VisiCalc one better.

Multiplan's main thrust in the competition is in its ease of use. VisiCalc is perhaps too cryptic to be attractive to users uncertain of their programming expertise. Multiplan has concentrated on simplifying the user interface—the screen as the user sees it—to make the use of the spreadsheet easier and more understandable.

Multiplan's commands closely parallel VisiCalc's. Multiplan also has seven new commands which are not found in VisiCalc*. Likewise, Multiplan provides the same functions used in creating formulas of a spreadsheet, adding twelve more of its own. Another special feature is the use of multiple windows to view different parts of a spreadsheet at one time.

One of the outstanding features of Multiplan is its ability to give individual cells meaningful names. This enables you to use the names of cells in your math so that you can create a formula of sales costs and have the new value appear in a cell named "Profits." This ability to name cells and use them in spreadsheet mathematics simplifies the logic required to create complicated spreadsheets. Multiplan requires 64K and one disk drive. Microsoft Consumer Products.

Multiplan Electronic Worksheet* A quick way to develop worksheets and solutions to the problems of planning, modeling, and forecasting. Features allow you to linkup various worksheets, print out finished reports, ask the computer for assistance, do analysis and forecasting, and tabulate engineering data. Microsoft Consumer Products.

Multiple Applications Software See Incredible Jack*.

Multiple BASIC Statements on One Line You can put a colon (:) at the end of one statement and continue entering another statement on the same line without giving a new line number. The line number at the left refers to all statements on the line.

Multiplex Use the same component for several distinct functions, either sequentially or simultaneously. The address lines of an MPU are often used as the data lines at another point in time—an example of multiplexing.

Multiplication and Division* A program that introduces the student to basic multiplication and then moves him up to the fourth-grade level. Right On Programs.

Multiplication & Division Fun* These two functions are tested by tables consisting of twenty questions each. Re-testing incorrect answers aids the student in perfecting skills. Ideatech Company.

Multiplication Facts Diagnostic* The teacher sets the time for students to solve a problem, the level of difficulty, and the number of practice sheets to be printed out after a testing session. The tests evaluate student knowledge. The computer prints out the results and offers practice sheets for review. 48K. Disk Depot.

Multiplication Grafica* Develops the concept of multiplication. Grade levels two through four. 32K. Applesoft. NTS Software.

Multiploy, by Paul Coletta* An arcade game for arithmetic drill and practice; allows choice of problems (addition, subtraction, division, or multiplication) and selection of difficulty level (one to three). The answers must be typed in and then the RETURN key depressed to fire, if the answer contains fewer than the maximum number of digits for that set of problems. The keyboard action is very slow, as each digit must be displayed on the screen before the RETURN key will fire the lazer cannon. The multiplication problems at level three with the lightning speed option are very difficult, but are useful for estimation practice. For ages four through fourteen. Reston Software.

Multi-Purpose Memory Expansion Card* A card providing eight 16K RAM pages (totalling 128K) in one slot. Just plug it in and you are ready to use your new memory. A DOS 3.3 support disk is included which provides the software necessary to emulate an electronic disk, load BASIC programs quickly, load DOS into the RAM card (giving DOS additional space for larger programs), and more. There is also a processor port, to be used by the STB processor card, which allows direct addressing of the full 128K of memory. STB Systems, Inc.

Multi-Tasking Running two or more tasks concurrenty on a single computer. The MPU actually works on only one task at a time, but it switches back and forth so rapidly as to create the impression that all tasks are being processed concurrently.

Multiterm One* A package that allows personal response to the Computerized Interactive Television (CIT) system. Students can actively participate in training and teaching programs using a hand-held numeric keypad. Offers immediate feedback, relieves intimidation of keyboards, communicates instantly with the microcomputer. Requires Gen Tech ETS-2000 system. General Technical Corporation.

Multi-Year Planning Model* Produces a full range of financial ratios and allows for user-defined assets, liabilities, equity, and revenue and expense accounts to define long term profitability strategies. Built-in modeling capabilities help the user determine the effects of those strategies on future profitability and financial capability. Data Systems, Inc.

Munch-A-Bug* A 6502 debugger which relocates itself below DOS, or may be run in a RAM card. The "pass pointer" feature allows the execution of a Machine language subroutine without interfering with main program execution. Symbol tables can be designed and connected, there are several memory modification commands, and a variety of screen displays. 48K. Southwestern Data Systems.

Music BASIC. To activate the Apple's speaker, it is necessary to POKE values for pitch and time into memory locations and then call a music subrouting. A sample of a music program is:

```
10 DATA 173,048,192,136,208,004,198,001,240,
008,202,208,246,166,000, 076,000,003,096
```

```
20 FOR L = 1 TO 18: READ X: POKE 768 + L, X:
NEXT L: PITCH = 0: TIME = 1: MUSIC = 768
30 INPUT "WHAT VALUE DO YOU WANT
FOR THE PITCH?";N
40 POKE - 16336,0: POKE TIME, mm: POKE
PITCH, N: CALL MUSIC
```

mm is the value for the TIME duration of the note and may range from 0 to 255 (the larger the number, the longer the note). The appropriate values to POKE into PITCH for different notes are:

Note	First Octave	Second Octave	Third Octave	Fourth Octave
C	192	96	48	24
B	204	102	51	25
A#	216	108	54	27
A	229	114	57	29
G#	242	121	61	30
G	225	128	64	32
F#	136	68	34	
F	144	72	36	
E	153	76	38	
D#	162	81	40	
D	171	86	43	
C#	182	91	45	
C	192	96	48	

Lines 10 and 20 set up the Machine language program to operate the speaker. Lines 30 and 40 constitute the main program in this example, which only produces one note. Line 40 could be used as the subroutine. Any program which would call the subroutine would need to define PITCH (values from 225 to 48 on the table above) and TIME before calling the MUSIC routine. To generate an entire melody, you must read the values for PITCH and TIME in pairs from DATA statements, and insert them into a line similar to line 40.

```
nnn FOR L = 1 TO X: READ PH,TM:
POKE PITCH,PH:POKE TIME, TM:CALL MUSIC
```

X is equal to the number of DATA pairs for your melody.

Music Cards MC1 & MC16* A peripheral board for your Apple computer which enables you to create music and sounds. This very sophisticated system has either three or nine independent voices, triplet and dotted notes, and more. ALF Products, Inc.

Music Composer* A music system that provides total control over as many as four musical voices. The program provides these services: play as many as four voices simultaneously, build timbres through Fourier construction, save music on disk, display voices while music is playing, and hear music through the Micro Music DAC card (an amplifier is located on card). 48K. Micro Music, Inc.

Music for Children * With a picture menu, as in the other games in this series, the child may choose to work on a quiz to identifying the notes either in bass or treble clef, or on the keyboard. After initial work with this game, the player may press CTRL-J to jump over the easier parts. The rest of this disk is devoted to methods of playing and recording melodies.The notes are played by pressing a number key; if you want to record a series of notes in memory, press the space bar. All succeeding notes will be saved in memory until the space bar is pressed again. Pressing "P" will play back the melody from memory; "S" will allow you to save the melody to disk by assigning a name and pressing RETURN; "L" will later load the melody from disk to memory when you specify the name. Kaleidoscope is similar to Perform/Record/Playback with the addition of graphics. Again, pressing the space bar will start and stop the recording mode in memory, and this melody—with associated picture—may also be saved to disk. In Melody Tutor, you need to have a melody already resident in memory. The program will play the melody in the form of Simon Says, playing one note, waiting for the child to echo that note, then playing two notes, waiting for the echo, etc. The echo must always be played from the beginning; if an error is made, the tutor goes back to the place where the mistake was made and starts a review. Counterpoint Software, Inc.

Music Games* Helps you understand the art of music. There are twelve separate programs; some of the topics covered include movement on a staff, note and rhythm recognition, measures and musical pictures. Helpful sound and visual aids. 48K. Howard W. Sams Co.

Music/Sounds Software Adams Music Disk; AMD—The Assistant Music Director; Apple Music Theory; Applesack 6—Music & Graphics; Arnold; Auto Digisong Player; Basic Ear-Training Skills; Caroling Caroling Series; Chord Mania; Christmas Album; Composer's Assistant; Con*putation; Creativity Tool Box; CyberLOGO Turtle; Digisong Paks; Doremi; Elements of Music—Series; Envelope Construction; Envelope Shaper; Experimenter's Package; Find the Key; Harmonious Dictator; Harmony Drills: Set1; Interval Mania; Key Signature Drills; Make A Tune; Melodious Dictator; Micro Composer; Music Composer; Music for Children; Music

Games; Music II; Music in Theory and Practice (Volume 1, 2nd Edition: A Computer Assisted Supplement); Music Lover's Guide for Teachers; Music Lover's Guide to Composers; Music Lover's Guide to General Music Terms; Music Lover's Guide to Italian Terms; Music Lover's Guide to Musical Instruments; Music Lover's Guide to Musical Symbols; Musical Theory; Musical Tutor; Musical Match-Up; Musical Staff Drill; Musicmaster; Musicomp; Musicsystem; Name That Tune; Note Trespassing; Notewriter; Pitch Drill Without Accidentals; Pitch Drills with Accidentals; Process and Other Programs; Rhythm Drills; Rhythmic Dictator; S.A.M.; Single Albums; Sir William Wrong Note; Songs in the Key of Apple; Sound; Super Music Synthesizer; SuperSound; Tuner; Turbo-Traks.

Music in Theory and Practice (Volume 1, 2nd Edition: A Computer Assisted Supplement)* A thirteen-disk, seventy-assignment supplement to the well-recognized text: Music in Theory and Practice. 48K. Micro Music, Inc.

Music Lover's Guide for Teachers* With this program, the teacher can enter his own information into the Music Lover's program format. 48K. Micro Music, Inc.

Music Lover's Guide to Composers* 48K. Micro Music, Inc.

Music Lover's Guide to General Music Terms* 48K. Micro Music, Inc.

Music Lover's Guide to Italian Terms* 48K. Micro Music, Inc.

Music Lover's Guide to Musical Instruments* 48K. Micro Music, Inc.

Music Lover's Guide to Musical Symbols* 48K. Micro Music, Inc.

Music Maker*. Even if you play only the demonstration program, you will enjoy this diskette, as it plays many different melodies while running through the capabilities of the program. The author, Jim Baldridge, displays a puckish sense of humor and a good knowledge of music. You can choose from notes in a four-octave range (below low C to F# above high C); control the time for each note, from whole notes to a quarter-grace note (256th of a whole note); and also include dotted notes and triplets. When was the last time you were able to make the dotted note exactly 1-½ times as long as its undotted counterpart, or play a series of triplets precisely against a regular beat in the left hand?

You can set the key at the beginning and all the proper sharps or flats will be entered automatically; if you want an accidental, type "N" for natural.

It is possible to compose a melody containing chords and multiple voices, but this will require experimentation on your part. The maximum song length is fifty-eight sectors (14K) on disk. Once a song is saved to disk, it may be used in an Applesoft program by the use of CHR$(4) and BRUN or BLOAD. In the case of BLOAD, you may CALL the location later to start the melody; this will take care of all disk access at the beginning of your program. The songs also may be used from an Integer BASIC program, which is especially useful in game design. The Music Maker may be used to create "non-musical" sound effects, and to create Machine language modules. Sublogic Communications Corp.

Music Theory* A drill and practice program that uses Apple's graphics and sound to teach terms and notations, pitch, rhythm, intervals, chords, and scales. Recording sheets are included and the computerized music drills give the student the chance for the private concentration needed to improve individual performance. 32K. Minnesota Educational Computing Consortium.

Music Tutor* Total ear training and basic musicianship software that offers extensive free mode drills; chords, tunings, notation, melodic games; and a teacher option that figures out the appropriate level of difficulty. 48K. Passport Designs, Inc.

Music II* A group of programs for the Microproducts ADC/DAC card that turns the Apple II into a music synthesizer. With these programs, you will be able to create intricate waveforms, enter and edit musical scores, transform scores into computer musical instructions, and play music through DACs. You will be able to create and call up, when needed, a library of musical instruments. You will also be able to play four notes and several instruments at the same time. These programs are written in Machine language and can support a variety of printers. Microproducts.

Musical Match-Up* A music game where, playing against the computer, you try to match pairs of chords that are played through the speaker. You will be able to customize the game to fit your skill level. Your choices are staff or chord name display, root position or inversions, and types of chords (major, minor, augmented, diminished, sevenths). There are several skill levels and the easiest levels can be played by those with no musical training. 48K. Notable Software.

Musical Staff Drill* A simple drill teaching correlation between piano keys and notes. A piano keyboard and grand staff are displayed; this is matched by the player with a piano key and selected by moving an electronic ball. 16K. Edutech Corp.

Musicmaster* An effective, exciting training program. When combined with the Alpha Syntauri, this program serves as a teaching aid, compositional aid, programmable synthesizer, and performance instrument. Each module offers you teacher management system, manuals and tutorials, record keeping for students, and performance analysis. Syntauri.

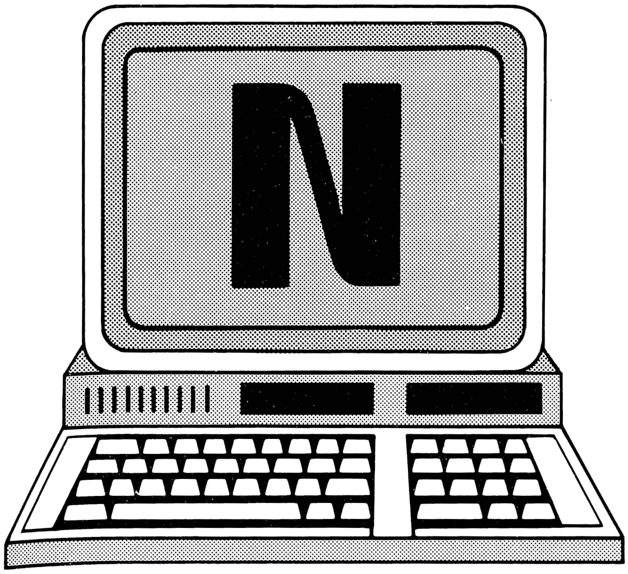
Musicomp* An electronic music sheet designed so that you can compose, arrange, store, and play your own tunes. If you are musically knowledgeable, you can edit, play, and record your own tunes. Even if you don't know much about music, you can have fun with this computer jukebox that uses Apple's built-in speaker or an external sound system. With this program, you can edit your songs note-by-note, show each note on a music staff so that you can learn musical symbols while you hear their sounds, connect the cassette output jack to a stereo system to play music using your personal computer, and set key and time signatures and the tone of each piece that you create. There are three "voices" and four timbre settings altering the tone so that you can arrange, as well as compose. For example, depending upon how you arrange things, you can produce the sound of woodwinds or of harpsicords. 32K. Apple Computer, Inc.

Musicsystem* This is an extremely comprehensive music system that will prove useful for the beginning music student as well as the technical musician. It contains a completely programmable sixteen-voice synthesizer capable of stereo output and polyphonic multi-voice chords. Musicsystem can teach anyone the basics of music theory and more advanced topics. It comes with a light pen you can use for editing the musical graphs created by the computer. Immediate enjoyment is provided by the music that is already entered and ready to run. Mountain Computer, Inc.

MXPLUS* A small circuit board that attaches to your Epson printer on the ROM 1B socket. You can set the print mode with three buttons instead of printer codes within your program. Eight print modes are possible, individually or in combination: double strike, double width, condensed, emphasized, italics, indent, eight lines per inch, and perforation skip. For Epson MX-80/100 Printers*. Dresselhaus Computer Products.

Mystery Function* Supplements the teaching of concept of a function; includes sound effects and response evaluation. 32K; DOS 3.2 and DOS 3.3. Indian Head Software.

Mystery House* Using simple English to solve puzzles, search the mystery house and try to find the secret passageway which leads to success or disaster. Hi-res graphics. Sierra On-Line Systems.



N Codes. ASCII = 78, HEX = 4E. n—ASCII = 110, HEX = 6E.

NAK Negative AcKnowledge.

Name & Address* A database that can organize names, phone numbers, addresses, important dates, and codes for home or business use. Contents can be searched. Wallace Micro Mart.

Name That Tune* A teaching game using familiar tunes. You will learn the identification of degrees of the scale using solfeggio syllables or scale degree numbers. 48K. Micro Music, Inc.

Names Rules for Variables in BASIC.

a) must start with a letter

b) can have up to 238 characters but Applesoft only recognizes the first two characters to distinguish one name from another. Thus APPLE and APTOS would be recognized as the same variable name.

c) cannot be or contain a reserved word such as IF, ON, AT, etc. (See Reserved Words for a complete list.)

d) may end with a type declaration character:

$ designates a string variable (0 to 255 characters—these characters may be letters, numbers, punctuation marks, etc.)

% designates an integer numeric variable (must be in the range -32767 to +32767)

If no type declaration character is appended to the variable name, it is treated as a floating point or real precision variable with permissible values in the range E-38 to E+38, with 9 decimal digits. This format is the default value for variables on the Apple II+ and the IIe.

Naming Compounds Drill* Randomly generated chemical formulas are displayed and the students must identify, by name, each compound. Microphys Programs.

NAND Not-AND logical.

NAND Gate Hardware device which implements the Not-AND logical function.

Natal Horoscope* The program uses an individual's birth date and time information to compute a natal chart in about ninety seconds. It also generates a spoked-wheel chart that spaces each planet proportionately in the house where it resides; includes room for seven planets each—more may be charted to the side of the table. Ten planets are charted, as is a wealth of other more specific information. AGS Software.

Natal Horoscope Package* Will output up to ten sets of two-page horoscopes that contain almost all important items of astrological data used by professionals. This is an inexpensive way to start a chart service because the user needs only a printer and a computer. As many as ten charts can be entered at once for processing. Built-in options include house system, midpoint sort dial, etc. User may print one or both pages for each chart. 32K; 48K. Matrix Software.

Natal & Progression Package* Allows you to formulate Natal Charts, Transit Charts, Secondary Progressed Charts, Solar Arc Charts, Naibod Arc Charts and Def/Year Arc Charts. Two charts can be displayed at one time around a circular chart wheel. The Radix chart is placed in the center of the wheel while the secondary chart is shown on the outer rim of the chart wheel. The second page lists aspects that are active in the examined charts. Also, batch processing of five to ten charts at one time is possible, the geocentric or heliocentric mode is user-selected, you are given solar arc directions, naibod & degree/year directions, and the transit picture. 32K; 48K. Matrix Software.

Native Code Machine-dependent language synonym for Assembler.

Natural Logorithm BASIC. See BASIC Statements, Table of Formats and Descriptions.

NBS National Bureau of Standards.

NC No Connection.

NDAC Not Data ACcepted.

NDSL Internal Billing System (NIBS)* Computes interest on loans, bills, reports, and accounting data. Creates a schedule for repayment of loans and automatically updates accounts as payments are received. 55K. Software Creations.

NE Not Equal. (The sign for not equal is ≠.)

NEC Spinwriter Graphics* Software driver routine that lets you dump hi-res pages out of the NEC Spinwriter printer. Features true proportional results that are usually offered only with letter quality printer graphics. Computer Stations, Inc.

NEC 1202 Monitor* The NEC 1202 is a high-resolution color monitor. It comes complete with a color kit that includes a cable and plug-in modules for intensity control. Jack Strick & Associates.

Negative Logic Normally true state voltage in the computer system represents a logically false state. A normally false state voltage in the computer system represents a logically true state.

NEQ Not EQual to (≠).

Nestar Cluster/One "Model A"* A system that interconnects from two to sixty-five personal computers. The user can work in either DOS or Pascal and each station can store up to thirty-three million bytes on a single hard disk. Other applications include inventory control, accounting procedures, mailing list management, word processing, financial planning, educational applications, and data aquisition. Communication cards contain 2KB of ROM, 1KB of RAM, and all necessary bus electronics. Nestar Systems, Inc.

Nested Subroutine A subroutine which is within another subroutine. The inner subroutine (nested) is completed first, and the outer subroutine is completed after the nested subroutine has finished.

Net Energy for Feedlot Cattle* Uses the Lofgreen method for determining the net energy available in any given ration and provides an estimated weight gain in pounds per day for animals consuming that ration. AG-COM.

Network Computers can be interfaced to form a system which is interconnected i.e., a network.

Net-Works* An information management system that can be used with a modem to establish a communications network, bulletin board service, or general message center. Features immediate log-on, security protection, editing, and downloading programs. 48K ROM; DOS 3.3. Computer Stations, Inc.

NEW BASIC Command. NEW deletes the program currently in computer memory and clears all variables. The format is:

```
NEW
```

NEW generally is used to clear all memory before entering a new program. BASIC will always return to command level after NEW is executed. TRACE is not turned off by NEW. See TRACE and NOTRACE. NEW is not implemented in Compiler BASIC.

NEW—Starting Programs To start a new program enter:

```
NEW
```

This completely erases all lines now in BASIC's memory. If there's something you want to keep and haven't already stored on diskette, SAVE it first. If you don't erase the program in memory before starting on another, you will usually wind up with an unusable combination of lines from your old and new programs.

New File To make a new file on a diskette, as opposed to modifying an existing file, is to "create a new file." This can be done through COPY, BASIC, or several other ways.

New Step by Step, The* A BASIC learning tutorial which includes voice instruction on cassettes that accompanies the programming concepts which are illustrated on the screen. The included workbook includes sample programs, practice programming problems, and summaries. Cassette and disk. Program Design, Inc.

Next End of FOR...NEXT loop in BASIC. See FOR...NEXT.

N.E.X.U.S., The* An electronic mail system that interfaces the Apple terminal with the HOST system. This relationship increases data transmission rate; provides messages, file downloading, graphics, and grouped discussion files. Requires (N.E.X.U.S. U.C.I.) 48K; disk, micromodem. (N.E.X.U.S. HOST) 48K; two disk drives, Language card, micromodem, and clock. Sir-Tech.

Nibble Half a byte or four bits.

Nibble*—Apple Computer Magazine Considered by many (including the publisher) to be *the* magazine for the Apple computer, *Nibble* emphasizes program listings, which you can key in yourself, thereby learning much about your Apple while you do. These programs range from the business-oriented, to games, to outright craziness. The programs are written in a combination of Applesoft and Machine language; there are directions for entering Machine Code. If you prefer, you may order a disk containing the principal programs of each issue. *Nibble* also publishes *Nibble Express*, which binds the major articles and programs for a year's issues (8). Included in the discussions are upgrades and corrections which have been discovered since the original publication. The subscription address is:

Nibble
MicroSparc Inc.
Box 325
Lincoln, MA 01773

Night Before Christmas* A very entertaining version of this Christmas classic that uses low-resolution graphics with animation. 32K. Homeware.

Night Mission Pinball* A pinball game written for the Apple II, Apple II+, Apple IIe, and Apple III computers. Consists of a plain view of a typical pinball table complete with flippers, bumpers, chutes, and the rest of the fittings (including the sound effects which make up a pinball game). The game can be played with a joystick or on the computer's keyboard. Up to four people can play and the score attained by each individual is displayed on screen for the duration of the game. Once a game has been completed, high scores are displayed. Action in this game is fast. The action of the striker is controlled by the arrow keys in keyboard play and by the position of the joystick in joystick play. The difficulty of play and ball movement characteristics may be changed; special modes of play have been designed by the manufacturer of the game. The user can modify the modes to suit his needs. Game parameters such as sound, ball friction, ball speed, bumper impulse power, and similar parameters are adjustable by the player. The manual which accompanies this game is quite brief, but it is adequate in its description of the game and the manner in which modifications can be made. SUBlogic.

NMI Non-Maskable Interrupt. A call to the 6502 microprocessor by pulling the line on pin 29 low and starting the interrupt routine at $03FB.

Noise Interference on a system communications line or random unknown signals.

NOMON DOS Command. Cancels the effect of the MON (q.v.) command; all succeeding DOS commands will be executed without being printed on the screen.

Non-Destructive Read-Out The memory contents are not erased or displaced when other data is read.

No-Nonsense Books* An easy-to-learn, small business general ledger package. Begin with high school level bookkeeping, and this system will provide you with professional-level help with your accounting. The system provides pre-named accounts, store sales, records in five profit centers, and keeps records of all checks and journal entries. Includes accounting functions and generates various reports. 48K; two disk drives; and a 132-column printer. Moneydisk.

Non-Text Files A text editor is an editor program specialized for text files. A text editor manipulates ASCII characters such as letters, punctuation marks, etc. Using the on-screen editor mode with ESC-A, etc. (q.v.), Global Program Line Editor programs, or various word processing programs are all examples of text editors. Their basic function is to create and change text data such as a letter, report, program, or book. The System Monitor (q.v.) is a means of editing non-text files such as Assembly and Machine language programs. Non-text editors usually display and modify a byte of storage either two hexadecimal digits. See Editor and Edit.

NOP No OPeration. Also, NOOP. An instruction which forces a delay of an instruction cycle without changing the contents of the registers or the status flags.

NOR Condition of being Not-OR.

NORMAL BASIC Command. NORMAL will return the screen display to white characters on black background after the FLASH (q.v.) or INVERSE commands have been invoked.

Normal Size Print To return to normal 10 character per inch print size, you must turn off all non-standard print options that may presently be turned on. See Type Format—for complete instructions and examples.

NOT Negative operation which changes every 1 in a byte to 0 and every 0 in a byte to 1. Also used as a logical operator to reverse the outcome of a conditional test in many languages (If X NOT = 1).

NOT-AND Logical Operator A NOT-AND B is a synonym for NOT (A AND B).

Notch A diskette is write-protected if it does not have a write-protect notch on the right side. The notch could be missing altogether (as on the original Apple III diskettes) or covered over with an adhesive tab. This blocks a small spring-loaded switch or a light beam inside the diskette and is sensed by DOS diskette driver programs. You will get an error message WRITE PROTECTED anytime you attempt to alter a file on a write-protected diskette by changing it, deleting it, or copying a file onto the write-protected diskette. If you attempt to initilize a write-protected diskette, the message will be I/O ERROR.

You are allowed to use files, load them, or copy from the write-protected diskette. The purpose of these limitations is to prevent accidental loss of your only copy of programs or data. In most cases, the procedure is to copy the write-protected diskette onto a notched diskette, put away the write-protected diskette as a permanent copy, then modify the notched diskette. In some cases, you might remove the adhesive tab from the write-protect notch and proceed to change the diskette.

It is a good practice to put an adhesive tab (supplied with boxes of diskettes) over the write-protect notch of any important diskette you will backup. Then if you accidentally ask for the backup in the wrong direction (from the old diskette to your important diskette), you will get a second chance to make the backup rather than losing your data.

Note Trespassing* A game that enables a beginner to learn how to read music. Graphics are used to show notes that dynamically move across the musical staff. The objective of this game is to eliminate notes by matching them with their letter names before they reach the end of the row. Some options are muted response, three levels of difficulty, and a choice of clefs (treble, soprano, alto, tenor and bass). Instructions included. 48K. Notable Software.

Notewriter* Offers you a special way to compose and learn about music. This software includes a total note processing editor so you can change key, insert or delete ties, triplets, etc.; monophonic transcriber that will write what you play; a manual; and diskette. 48K. Passport Designs, Inc.

NOTRACE BASIC Command. Turns off the TRACE mode (q.v.).

Novelties* Four programs are packed into one. The fun of making messages and colorful letters is included with Block Letters, while Sign will cause a message to repeat in lo-res block lettering. Code lets you write messages in a code that only you or your friends can understand. Finally, Mystery Ouiji will tell the future on the screen. Compu-Tations.

NSEC NanoSECond. One nanosecond is equal to one billionth of a second.

N.T.S.C. National Television Standards Committee. A committee that sets the standards for video performance, signal generation, signal synchronization, and such. Monitors and video interfaces should comply with these standards.

Null Detector A circuit which registers when current is not flowing or when voltage is not present.

Null String or File A string or file with no contents at present.

Number Largest line number in BASIC. The largest possible line number for a BASIC program is 65529 (in Applesoft) or 32767 (in Integer BASIC).

Number, Convert from String BASIC. See VAL.

Number, Convert to String BASIC. See STR$.

Number Crunching The performance of complex arithmetic operations and computations.

Number Format Numbers are stored internally to over nine digits of accuracy, but when printed, only nine digits are shown. These nine digits may appear on either or both sides of the decimal point. Leading zeros for positive numbers greater than one will not print, but leading zeros in the decimal portion of a number will print and will be counted in the total of nine. One leading zero before the decimal point will be displayed when the number is less than one. In Integer BASIC, the numbers must be in the range -32767 to +32767. In Applesoft (floating point) BASIC, the numbers must be in the range 1.701E-38 to 1.701E+38, or an OVERFLOW ERROR message will result. A number whose absolute value is less than about 3E-39 will be converted to zero by Applesoft.

When a number is printed, the following rules are used to determine the exact format:

1)If the number is negative, a minus sign (-) is printed.

2)If the absolute value of the number is an integer in the range 0 to 999999999, it is printed as an integer.

3)If the absolute value of the number is greater than .01 and less than one, it will be printed with no exponent.

4)If the absolute value of the number is greater than 1 and less than 999999999.2, the number is printed in fixed point notation (trailing decimal) with no exponent.

5)If the number does not fall into categories 3 or 4, it will be printed with scientific notation.

Rounding of numbers is not totally consistant, so the final digit displayed may be + or -1 from the expected value.

Scientific notation is used to print real precision numbers, and is formatted as follows:

SX.XXXXXXXXESTT

Where each X is a digit from 0 to 9. The leading S is the sign of the number (nothing is printed if the number is positive.) One non-zero digit is printed before the decimal point. This is followed by the decimal point and the eight digits of the mantissa. The E stands for exponent, the next S for the sign of the exponent. The two Ts are the digits of the exponent itself; if the value of the exponent is less than 10, it will be printed with a leading zero, e.g., 06.

Number of Files on Diskette Use of CATALOG; DOS listing command. CATALOG allows you to see on the screen a list of all or selected files on a diskette. Each file displayed will show file name, size in sectors, and type of file (Applesoft, binary, locked, etc.).

Number Series* An eight-program series which gradually increases your mathmatical skills. Program Design, Inc.

Numeric Pad The keypad on the right side of the Apple III keyboard upon which numeric operations and numeric data can be entered. A peripheral numeric keypad is available for the Apple II+ and IIe. See TKC Keypad.

Numeric Value of String BASIC. See VAL.

Numeric Variable—Integer Variable names for numeric whole numbers (integers) from -32767 to +32767 end with %. Integer (whole) number variable names must start with a letter, can have up to 238 characters, and must not be (or contain) any reserved words (q.v.) or any special characters such as punctuation marks. See Names.

Numeric Variable—Single Precision Floating Point Single precision floating point numeric variable names must start with a letter, can have up to forty characters, and must not be reserved words such as IF, ON, THEN, GOTO, etc. or a reserved word followed by a type declaration character ($,%,!,#). See Reserved Words for a complete list. See Names.

Numerical Analysis* Plots the function, integral, derivative; determines the roots, maxima, minima, and integral value. Plots in hi-res two dimensions with automatic scaling. Spectrum Software.

Numeros, Todos en Sus Lugares!* Spanish equivalent of Places, Everyone!* concerns identifying place value and translating word numbers to digits. Students are asked to type in numerical representations with commas, where necessary. For grade levels two to four. 32K. Applesoft. NTS Software.

Nutricalc* Assists the nutritionist and dietician in the development of menus and calculation of food intake. Features a collection of 750 common foods cross-referenced with eighteen often-used food nutrients. Develops standard menus, comparisons, combinations of food, and requires no computer experience. PCD Systems.

Nutrichec 2.0* Construct your own dietary intake for maximum good health. Prints listings of nutritional values, calorie counts, recommended serving sizes, and more! Up to 1,000 individual foods are recorded. 32K; printer. Wims Computer Consulting.

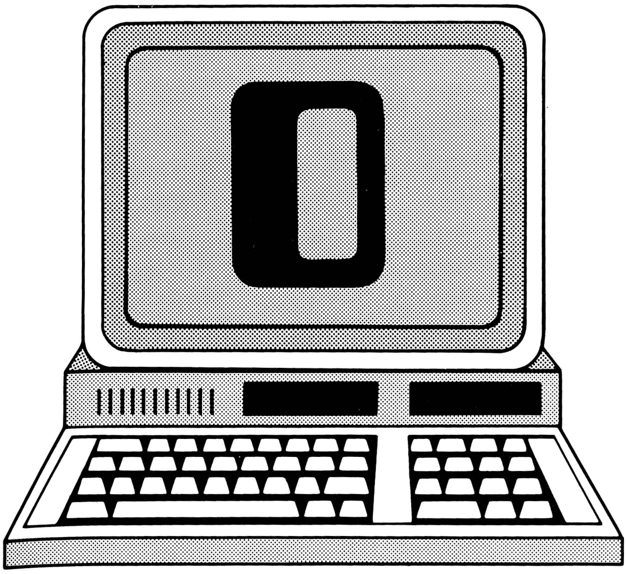
Nutri-Pack* Analyze the quality of your diet for over 600 foods. Become aware of the nutritional value, number of calories, grams of fat, and grams of protein each of these foods contains. Database included. Micro-Comp, Inc.

Nutrition Volume 1* Geared to students twelve years and older, for dietary analytical purposes. Includes almost 600 foods, nutrition reports, menu planner, and more. 32K. Minnesota Educational Computing Consortium.

Nutrition Volume 2* Similar to Nutrition Volume 1*, this program can, in addition, relate caloric consumption to energy levels. Contains a catalog of over 400 food items plus input forms for charting and supplying information to the computer. 32K. Minnesota Educational Computing Consortium.

Nutritionist* Conveniently assists you in planning diets for maximum mineral and vitamin intake. Evaluates ideal weight for indivuals according to input factors of age, sex, height, and activity level. Database can record over 700 foods. N2N Squared Computing.

N2 Market Analyzer* Designed to create and make analogies on indicators and indexes of market analysis. The keyboard is used extensively for functions varying from mathematical operations to statistical readouts. 48K. N-Squared Computing.



O Codes. ASCII = 79, HEX = 4F. o—ASCII 111, HEX = 6F.

O Output, or Overflow.

[O] The O parameter may be used with PIP in copying or transferring a file. This parameter must be enclosed in brackets at the end of the PIP command line. When the parameter is used, PIP will disregard the end of an object file during the concatenation of files.

Object Code The code produced by a compiler or Assembler program. The object code is directly executed by the computer.

Object File A file containing the 6502 Machine language version of a program. On your system master diskette, there are object files which are shown as binary files (e.g., Boot13, Chain, or Copy.ObjO). DOS uses an abbreviated form of CATALOG listing and does not show the address and length of binary files, as is true when the files are the result of using an Assembler. If you have created a source file (q.v.) using an Assembler (q.v.) you save the source file with the extension .S; you assemble the source file to make an object file. After successful assembly, the object file may be saved under the same name as the source file but without an extension. The file name will show the originating address of the object file when it is BLOADed or BRUN, as well as the length in hexadecimal bytes.

Object Program Machine language program resulting from translation of a source program (q.v.).

Object Programs See Machine Language Program.

Odd Parity A byte in which an odd number of bits are set to 1, is said to make odd parity.

OEM Original Equipment Manufacturer.

Off Center* Designed for high school and beyond. This program deals with calculating and using the standard deviation. 32K. Micro Power & Light Company.

OFF EOF# A command statement in Apple III Business BASIC. This command enables a program to continue execution although it has encountered the end of a file while data from more than one file is being accessed. The OFF EOF# command statement turns off the ON EOF# statement.

OFF ERR In Apple III Business BASIC the ON ERR command causes the program to branch to an error message generating subroutine which explains the location and type of error encountered. The OFF ERR command is used to cancel the last ON ERR statement that was executed. The program can then be RUN again and will execute until another error is encountered—unless however, it has been completely debugged.

OFF KBD The OFF KBD command in Apple III Business BASIC is used to cancel the last ON KBD command that was used in a program. See ON KBD.

Office Manager* Keep track of any type of memo, message, or appointment. Any office can use this system to schedule work loads, assignments, files, records, etc. Full output capabilities for review, in user-designed format. Monument Computer Service.

Off-Line Off-line means that a device or medium is outside of, or disconnected from, the computer system. Compare with on-line, which means that a device or medium is inside or connected.

A diskette is off-line when it is in a box, and on-line when it is in a working diskette drive. A printer is on-line if it is attached, powered on, and ready to print. The printer is off-line if it is disconnected, powered off, or switched to its "off-line" state by an on-line/off-line switch. See Memory and Input/Output.

Offset Address The smaller part of a base register/offset pair. The data to be processed is located at:

<effective address>=<contents of
base register> + <offset>

Oil and Gas Companion* Automatically calculates income spending and combined interest billing. Two disk drives; parallel/serial acceptable; 132-column printer. High Technology, Inc.

Olympic Decathlon* Become the Olympic computer champion as you compete in all ten decathlon events. To win, you'll need good reflexes, an excellent sense of timing, and good hand-eye coordination. The animated graphics in this program are extraordinary and your level of involvement will remain high as you develop your "athletic" skills. You control the figure on the screen through the keyboard or game paddles; up to eight people can compete. MicroSoft Consumer Products.

OMNI I/O Board* Here is a comprehensive list of features offered on the OMNI: RS-232 serial input/output, parallel input/output with handshaking, 24-hour real-time clock with alarm, 2K EPROM with graphics, and six 2K PROM/EPROM expansion sockets (software selectable). This highly flexible board for your Apple computer comes with complete documentation. Eclectic Systems Corp.

Omni Plotting Package* A series of twelve programs that include maps and circles. Offers a full-color range, can be used for many functions, and comes with a manual. Programs include Gin Mode, Omni Plot, Window Plot, and Image Plot. Powersoft, Inc.

Omnibus Banking & Financial Pak* A program for planning and managing finances. Handles records and analyzes items such as investments, savings, mortgages and other loans, depreciation, amortization, and more. For small businesses or individual financial management. Digital Marketing.

Omnigraph* Hundreds of datum may be plotted on bar, line, or pie charts. Features overlays, editing, and data transformation. Educational Computing Systems.

Omninet Local Network* This excellent system transfers data at one million bits per second, and can support as many as sixty-four devices that share an RS-422 twisted pair of wires up to four thousand feet long. It has these features: transporter interfaces; shared access and distributed control; automatic error detection and correction; flexible device addressing; and network protocols. Corvus Systems.

Omnivision (Double Vision)* An 80-column card that has multi-language capabilities. Selection of 40-and 80-column is made with a switch. Omnivision uses a software program for operation. If a program supports this particular 80-column card, Omnivision will automatically come up. The Computer Stop.

ON EOF# A command in Apple III Business BASIC that instructs the computer to ignore an end of file record when data from a file is being used as input for a program. Unless measures such as this one are taken, the program halts when the end of data is encountered in a file. The "#" sign is used to designate the number of a particular file which is currently open, along with other files. Apple III Business BASIC allows up to ten files to be open at the same time.

ON ERR A command in Apple III Business BASIC that is used to highlight program errors which are encountered during the operation of a program. This command causes a branch to a subroutine which displays the location and nature of the error encountered. Once the error has been remedied and the OFF ERR command has been given to cancel the last ON ERR which was executed, the program can be RUN.

ON KBD The ON KBD command is used in Apple III Business BASIC to cause the computer to display the ASCII character for any one special key which is pressed on the keyboard during program execution. The ASCII value of any key pressed is displayed momentarily. The program then continues to execute.

On the Average* For high school level and up, this program works with the measure of central tendency (mean, mode, and median). 32K. Micro Power & Light Company.

On-Balance Volume Charting* A three-program package to help you keep updated on the stock market and on how well your stocks are doing. Breakouts and filed trends are charted, stock figures are updated, and stock quotes are listed. 48K. Stock Market Software, Inc.

ONERR GOTO BASIC Statement. Used to avoid an error message that would halt execution of a program when an error occurs. The format is:

```
ONERR GOTO linenum
```

ONERR GOTO causes an unconditional jump to the indicated line number if an error is later encountered. The statement should occur at the beginning of the program so the flag is set before any error can occur.

Online* Online lets you call your computer while you are out of town, and receive messages in privacy and with total security. It supports mail handling between user accounts and mail can only be read by the account holder to which it is sent. Online also supports auto-reply, read again, and delete modes. You will be able to keep the system entirely private for your own personal access. A special supervisory routine provides crashproof character input/output routines and protects the system against loss of carrier. If loss of carrier occurs, the system will re-boot and return to an on-line state to wait for the next call. Southwestern Data Systems.

On-Line Indicates that a device or medium is inside or connected. Compare this to off-line, which means that a device or medium is outside of or disconnected from the computer system.

A diskette is off-line when it is in a box, and on-line when it is in a working diskette drive. A printer is on-line if it is attached, powered on, and ready to print. The printer is off-line if it is disconnected, powered off, or switched to its off-line state by an on-line/off-line switch. See Memory and Input/Output.

ON...GOSUB and ON...GOTO BASIC Statements. ON...GOSUB and ON...GOTO are used to branch to one of several specified line numbers, depending on the value of an expression. The formats are:

ON <n> GOTO <line>[<,line>...]
ON <n> GOSUB <line>[<,line>...]

<n> is a numeric expression which is rounded to an integer, if necessary. It must be in the range 0 to 255, or an ILLEGAL FUNCTION CALL error message is displayed.

<line> is the line number of a line to which you wish to branch.

The value of < n > determines which line number on the list will be used for branching. If the value is 4, the fourth line number on the list will be the destination of the branch.

In the ON...GOSUB statement, each line number on the list must be the first line number of a subroutine. This means that at some time it will be necessary to have a RETURN statement to bring you back to the line following the ON...GOSUB.

The value of <n> is zero or greater than the number of items in the list (but less than or equal to 255), BASIC will continue with the next executable statement.

One Line—Advancing on the Printer To advance one line on the printer (space up) without carriage return, use the line feed button on the printer.

One Line—Multiple BASIC Statements You can put a colon (:) at the end of one statement and continue entering another statement on the same line without giving a new line number. The line number at left refers to all statements on the line. An apostrophe (') allows a comment or remark to be added after a statement, with or without a separating colon.

One-Type Account System 1* An accounting system for small businesses that will post income and expenses. It features a set of forty standard accounts, compatability with the corporation checking account, and the ability to summarize accounts to date. 32K RAM. Charles Mann & Associates.

OP-Amp Design* If you like to design your own operational amplifiers, the design specifications can be checked to see if they are applicable for the chosen paramaters. Six popular op-amps are available for referencing. Hayden Book Company.

OPEN The files with necessary data must first be OPENed so that the data contained therein is available to the running program.

OPEN BASIC Statement. The OPEN statement makes available I/O to a file or device. The format is:

OPEN file name (,slot)(,drive)(,volume)

OPEN makes available a buffer (for I/O) to the file or device. An OPEN must be executed before an I/O may be done to a device or file by any statement or function, including the following:

PRINT INPUT WRITE

APPEND (q.v.) can be used to add information to an already-existing file. The format is:

APPEND file name (,slot)(,drive)(,volumn)

This command opens the specified text file, but places the position-in-file pointer to the end of the file. After this command, the next character written into the file will follow the last sequentially written character presently in the file. An APPEND must be followed by a WRITE to the file of the same name. APPEND must not be followed by OPEN, which will reset the pointer to the beginning of the file.

Open Apple I The Open-Apple-I key on the Apple III computer toggles the insert mode (used in editing) on and off.

Open-Apple Key The Open-Apple key is used on the Apple III computer to give other keys additional uses. When this key is pressed, it sets the high bit for all keys pressed. This process adds 128 to the binary value of any key pressed.

Open-Apple-Left Arrow This combination causes the character to the left of the cursor to be deleted in the edit mode.

Open-Apple-Right Arow This key combination causes the character on which the cursor is resting to be deleted in the edit mode. It causes the character to the right of the cursor to be deleted in the insert mode.

OPEN# The OPEN# command is given in Apple III Business BASIC to specify a reference number for each one of a number of files that are open at the same time. Apple III Business BASIC allows up to ten files to be open at the same time. If the same number is used more than once to specify different files, the first file which was given a particular number is closed.

Operand Operations are performed upon entities called the operands. For example, LET A=B+C specifies that the operation of addition be performed on the operands B and C.

Operating System The software which manages the hardware and the logical reasoning of the computer. The operating system includes file management, scheduling of the processed requested, and the handling of any connected devices.

Operating System Software See APEX; Apple III Sophisticated Operating System (SOS); Complete Disk System; Copy Cruiser; CopyCat; Co-Resident Assembler; C.O.R.P. Program Generator; Datalock; Disk Certifier and Copier; Disk Prep; ProDOS; and Tape Drive Controller Package. See also Disk Drive Utility Software.

Operation Action of a program resulting in the execution and completion of a defined instruction.

Operation Code Part of the Assembler or Machine language program which specifies what operation is to be performed.

Operator Symbols within a program—such as (*) for multiply, (-) to subtract, or (+) to add—which specify what operation is to be performed.

Operator* Operator is an inexpensive device that will let your computer automatically dial and answer calls for you. When used in conjunction with an acoustic coupler or direct connect modem, your terminal will be able to communicate with other computers anywhere in the world, twenty-four hours a day. Just plug Operator in, load the software, and your system will be able to exchange programs and data, access databases and call up bulletin board information while you are out of town. Here are some of the features that you will find in Operator: automatic answer, automatic pulse dial, loopback self-test, operation to 300 baud, one year warranty, full and half duplex, RS-232 interface to comptuer, and a powerful command interpreter. TNW.

Optimization Changing either the software or the hardware of a computer system so that it operates faster or more efficently.

Options—Choose from Menu. A menu is a screen display which lists a number of possible options and asks the user to select one. When a selection is made by keying in an identifying number or letter (or positioning the cursor beside the desired item, using a light pen, etc.), the selected function is performed. This may require either a branch or subroutine call to the code for the function, or the program to carry out this function may be loaded into memory and executed.

Many application packages use a system of multiple menus. A Master Menu lists the major functions allowed. Selection of an option on the Master Menu causes another menu to display, indicating more detailed options for the selected function. This can be followed by even more detailed menus, and so on. Often completion of a function will cause re-display of the Master Menu. Such a system is called menu-driven.

Options—Program or Device. Values which determine the functioning of a device or program. For example, the screen can be set to 40 columns wide or 80 columns wide—the screen width option.

OR OverRun. The status flag of the Universal Synchronous/Asynchronous Receiver/Transmitter (UART) goes to 1 if a new character is written on top of an old one.

OR—Boolean Operator Allows the program to select either of two conditions when testing with an IF...THEN (q.v.) statement. The format is:

IF (expr1) OR IF (expr2) THEN .....

Or Transfer Mode The graphics driver on the Apple III computer is used to control the colors used in graphics displays, the locations of dots and lines, and to control the dimensions of the screen area used for graphics. The transfer mode of the graphics driver determines how colors are used in displays. There are four transfer modes: the STORE, OR, XOR, and BIC modes. The Or Transfer Mode uses the logical OR to determine which of two colors is to be used, and plots the color dictated by using this logic.

Order Entry* Provides the means for computing and organizing data, registering shipments and deliveries, recording individual history of vendors, and printing reports for puchase and sales orders. Compumax.

Order Entry* Handles a maximum of 750 items for inventory purposes. Features order processing, inquiry, and report printing. Software Technology for Computers.

Order Scheduler, The* Keep track of purchase information and stay ahead of low inventory problems. A variety of reports can be generated from files,including items on order, shipping schedules, order quantities, total numbers of orders, dates ordered/delivered, etc. High Technology, Inc.

Order Tracking System* Businesses can calculate and compare their productivity and sales. A number of values can be stored, compared, expanded, and projected toward future activity. The strongest area handled within the program is sales. Reports can be generated with regard to all activities. Apple Computer, Inc.

Orderit* This program helps your school media center keep up-to-date with its acquisition activities. Information regarding the materials you need is input into the program; you print out several copies of the order for all the offices that need one. When the order arrives, delete it from the on-order list and you will know exactly where you stand. 48K; cassette or disk. Right On Programs.

Organic Nomenclature* A thorough drill on the nomenclature and properties of alkanes, alkyl, amino, and aromatic compounds, and concepts of steroisomerism. Programs for Learning, Inc.

Organic Nomenclature* A study drill on IUPAC nomenclature of alkanes that are derived by random substitution of hydrogen by methyl, ethyl, or propyl groups on butane. Also offers practice with Alkyl, Amino, and Optiso. Includes all five programs with instructor's guide. Programs for Learning, Inc.

Orionrater* A series of insurance casualty rating programs for the professional insurance agent. The series is designed to compare and print out quotes from different property and casualty companies for a given class of insurance coverages. Includes: 1) Auto—can facilitate up to ten carriers per disk; 2) Mercury Casualty—consists of a California-only company; 3) Homeowners/Condo Owners & Renters; 4) Commercial Truck (requires Microsoft Z-80 card and 64K); 5) Commercial Liability—includes ISO rates for the 220 most commonly used business codes. Customized disks are available. 48K. Orion Business Systems.

OS Operating System.

Our Bodies* An introductory study of the body as a combination of biological systems. The program discusses each system and how we can take care of it. The presentation is followed by a game that tests student comprehension. Disk or cassette. Right On Programs.

OUT In CP/M, a special command called OUT can be given during a PIP operation to utilize a specific, non-standard output device. This command is used to access such devices from PIP. The syntax of the command statement which directs output in this fashion is *OUT = device name followed by a RETURN.

Output Information coming out of a program which may be going to a screen, printer, disk, speaker, etc.

OUTPUT WRITE data from memory. Memory is any device which can store information and allow it to be retrieved when needed. The Apple relies primarily on random access memory (RAM), read-only memory (ROM), diskettes, cassettes and hard disks. ROM and RAM together make up the internal memory or main memory of the Apple, or any other computer.

Compare this to external memory such as cassette, diskette, and hard disk, which involve mechanical motion to retrieve data and are thus hundreds or thousands of times slower than internal memory. Data in internal memory is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT). See Memory.

Output Buffer The Apple III RS-232 Driver sets aside space in memory for input buffers and output buffers which ensure that information flows smoothly to and from the device connected to the RS-232 port. When either buffer is full, the device which is sending information to the buffer stops until there is room to continue. The output buffer is used to feed data to an external device at the speed required to communicate with that device. If this buffer is full, the computer ceases sending data to the buffer until it has room.

Output Format In Apple III Business BASIC, output format is defined by using IMAGE and PRINT USING commands. The IMAGE statement specifies the number of characters on each side of a decimal point for numeric displays. The PRINT USING statement defines which program line will be referenced to use an IMAGE statement. A string spec in the PRINT USING statement defines the format which will be used to display a string value. A literal spec in a PRINT USING statement determines the number of spaces, returns, or copies which will appear in the output of such a statement. A numeric spec in a PRINT USING statement sets the type of numeric display which will be used for output of the statement. This spec can be a fixed decimal point, scientific notation, or engineering notation.

OUTPUT# The OUTPUT# statement in a program line dictates which one of several open files will be written to by a program which is running in Apple III Business BASIC. Up to ten files can be open at the same time in this language.

OUTREC The OUTREC statement is used in Apple III Business BASIC to dictate the line length which will be used when a program listing is being sent to a printer. This is a modifiable reserved variable in Apple III Business BASIC.

OV OVerflow. When the number of digits that result from a mathematical operation exceeds the number of registers available to hold the result, this is called overflow. See Overflow.

Overdue Books Program* This is an easy-to-use program for keeping your school library up-to-date on checked-out books. As books are checked out, each is entered by title, student name, and teacher and can be retreived by student name, teacher name or all books out. Deleting a returned book is a snap. Cassette or disk. Right On Programs.

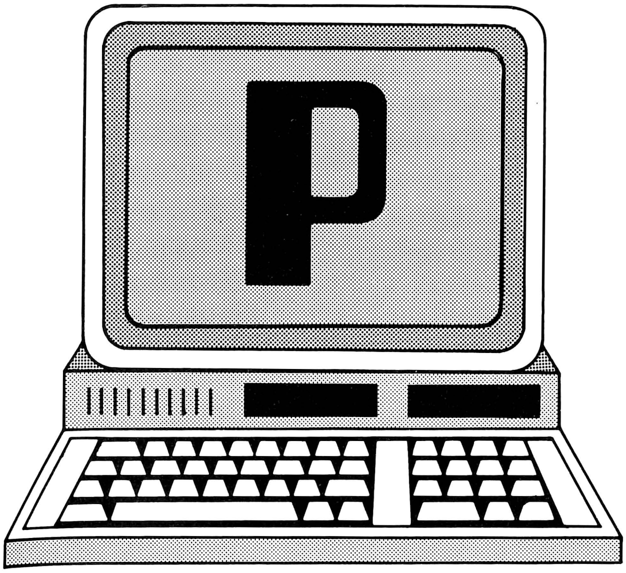
Overflow OV. The sign bit is filled from the next lower bit, and a status flag is set. Signifies that the result of the arithmetic operation is too large for the register specified.

Overlay Different routines within a program which occupy the same memory location. They are loaded as needed during the operation of a program. Conflict can occur if two routines with different overlays try to use the same location at the same time.

Over-Run Error The previous character in a register hasn't been completely read when a new character is loaded into the register.

Over-Striking The printer returns to a position where a previous character was struck and strikes a new character on top of it producing a combination character. Sometimes used for boldfacing.

Over-Voltage Protection The computer's circuitry is protected from undesirable increases in the AC power line voltage. Wisdom dictates additional protection by use of a surge protection (q.v.) device.



P Codes. ASCII = 80, HEX = 50. p—ASCII 112, HEX = 70.

P Parity (q.v.).

P Cursor Command The Apple III computer's Console Driver allows direct cursor commands in the escape mode. When the ESCape key is pressed, the boldface cursor should change to a white rectangle with a black "+" sign inside. The change in cursor indicates that it can move freely over the screen and specific screen control commands can be executed from the cursor's current position. If the letter P is pressed in the escape mode, the screen display is cleared from the cursor's current position to the end of the screen. The cursor position is not changed when this command is used.

Package, Software A software package is a group of computer programs, possibly including data files and documentation, used to perform a function or group of related functions on the computer. These are called applications software when they perform tasks not dirctly serving the functioning of the computer—as with a word processing package, an accounting package, etc. When programs facilitate the use of the computer and its peripherals, such as a Disk Operating System or a program development package, they are called systems software packages.

Packed Decimal Two or more binary coded decimal digits are present in every byte. The 10 decimal digits 0 through 9 are stored in a 4-bit representation. 1 is coded as 0001, 9 as 1001, etc.

Packet A short set of data. The first few bytes specify the length of the data stored. The set of data may then be carefully transferred between devices in a network.

Pad The rectangular base where the wire of a computer chip is connected.

Pad To fill a data field with blanks.

Paddle Graphics* A powerful hi-res graphic development system. Includes upper/lower case text, colored pictures, and shape tables. Sierra On-Line Systems.

Paddle Port Expanders and Extenders The following is a list of some of the major expanders and extenders on the market:

Expandaport* allows the connection of a number of paddle port devices. Datamost.

Game Socket Extender* simplifies changing port devices by extending the paddle connector outside the computer. Happ Electronics, Inc.

Octa Stick II* connects an Atari eight-position joystick to your Apple. Astar International Company.

Outport* extends the paddle connector outside the computer. Outport, Inc.

Paddle-AdApple* is an extender with two switch-selectable ports. Southern California Research Group.

Paradise Ports* allows any combination of three joysticks or paddles. Tech Designs, Inc.

The Port Authority* adapts two Atari joysticks to your Apple. Output, Inc.

Select-a-port* is a switch-selectable port expander that also extends the connector outside the computer. TG Products.

Twin Port* is a switch-selectable extender for two ports. Outport, Inc.

Paddle Shapemaker* A utility program that creates graphics using either game paddles or a joystick. 48K. Rocky Mountain Software, Inc.

Paddles, Game The following is a list of some of the major paddles on the market:

Adam and Eve, Tech Designs, Inc.; AZD Paddles (2002), AZD Company; Hand Controllers, Apple Computer, Inc.; Pro Paddles, Rainbow Computing; TG Game Controllers, TG Products.

Page Length Setting the printer. To set page length (for example) to fifty-five lines per page, enter BASIC statement:

```
PRINT CHR$(27)"C"55
```

Do not use 0 or 128, which will interfere with the proper signal for the CHR$(27).

Page of Memory The total memory of the Apple which can be directly addressed includes 65536 distinct locations. This 64K is divided into 256 "pages" with 256 addresses in each. As an example, page four consists of the 256 locations starting at $0400 and ending at $04FF (1024 to 1279 decimal). Because each memory address consists of two bytes, you can think of the first two hexadecimal digits as the page number, and the second two digits as the location on that page.

Pages See Screen Pages.

Pages, Screen See Screen Pages.

Paging Especially in a word processing program, to switch on the screen from one full screen of information to another. You can page either backwards or forwards.

In memory, a page is a logical set of storage used for the management of memory; in a paging system, the memory location is designated by a page number or address and an address within the page.

Paint Master Scene Utility* Create, edit, and color your own programs or games. Draw everything from straight lines to scenery. 48K. Avant-Garde Creations.

Painter Power* Design simple to complex illustrations. Each may be saved or merged together for a movie simulation effect. 48K. Micro Lab.

Palabras en Palabras* Draws the student's attention to the use of specific letters in the correct spelling of English words, and demonstrates English spelling patterns. The student is asked to choose which four-letter words can be made from letters in a longer word. 32K. NTS Software.

Palabras, Palabras* A game in which the student learns by changing the letters of a three-or four-letter English word to form a new word. Grade level two through five. NTS Software.

Paradise Ports* A device which is installed in the game I/O socket in the Apple II, II+, or IIe computer to allow any combination of up to three different game controllers to be connected to the computer at the same time. You can allow a single device of this type to be used at a given time by switching to the desired controller. This device consists of a thin circuit board with two switches on its face, a connector cable, and a plug which fits the Apple game I/O socket. Paradise Ports uses two switches to allow the selection of a particular controller from three of the four plugs on the board. One of the important features of the Paradise Ports can switch multiple controllers on and off without unplugging them or opening and closing the Apple's case to change them. Tech Designs, Inc.

Paralax* A utility package designed for creation and manipulation of characters. These shapes may be edited, copied, rotated, and more! These options aid the user in producing games, charts, and displays using a variety of fonts and shape sizes. Apple Computer, Inc.

Parallel Simultaneous handling of processes, transmissions, or storage of data. In most microcomputers, parallel I/O conections have eight wires to carry eight bits of a byte simultaneously (or in parallel). Contrast this with a serial interface, where only one data wire is available. The eight bits of a byte are transmitted one after another (or serially). The I/O device must collect all eight bits back into one eight-bit byte.

Parallel Boards See Printer Interface Card.

Parallel Circuit Analysis* A review of parallel circuitry using an example of three resistors and a battery. Explanations cover potential differences, resistance, and power. Microphys Programs.

Parallel Port Card (1005)* A completely assembled printer interface that can be used with Centronics 779, Anadex, Okidata, or SWTP PR-40 printers. Includes Parallel Output Port Card, printer driver software, and printer connectors. Microproducts.

Parallel Printer Board* Connect most standard Centronics-type printers to your Apple with this parallel board. A special feature of this board is its ability to turn the high bit off and on from software (not available on all printers). Micro-Ware Distributing, Inc.

Parallel Printer Interface* Plug this board into your computer, and you will have an interface to any Centronics-compatible printer for your Apple. Step-by-step instructions are provided for installation. Available as a kit or completely assembled. John Bell Engineering, Inc.

Parameter Another name for a definable variable in a program or system which can be used to send information to and from a subroutine or procedure. A parameter may take on various values which are used in subsequent processing by a program.

Parans* Will sort the RAMC's of settings, culminations, anticulminations, and risings of planets. AGS Software.

Parent Reporting* Teachers can easily send messages home for the entire class. Each message can be labeled with student's name, and grades can be reported for a variety of categories. Personal messages can be included, so teachers can help parents become more aware of what's going on in the classroom. Educational Time Sharing Systems, Inc.

Parity Error detection technique that uses a one-bit indicator at the end of a word. Odd parity sets the parity bit to make the total number of 1-bits odd. Even parity sets the parity bit to make an even number of 1-bits.

Parser A routine that analyzes a program instruction to set up its tree structure according to the programming language's syntax.

Partial Pathnames The Apple III file handling system under SOS utilizes pathnames to access files. The pathname includes the volume (disk name) on which a file is stored, the directory in which a file resides, a subdirectory (if used), and the file name itself. A prefix can be used to designate specific files in a subdirectory. A partial pathname only uses the prefix and the file name itself to access a particular file.

Parts of the Microscope* Depicts a microscope on the screen and demonstrates the various parts and their functions to students. A drill is included for each program segment which produces a short learning segment when a wrong answer is given. A correct answer is rewarded by a short animated sequence for junior high school students. Educational Activities, Inc.

Pascal A structured computer language, descended from ALGOL 60. Added features include "records" (data structure definition) and "sets." It is suitable for a wide variety of chores, from systems to application programming. It is designed so that those other than the original programmer can easily understand the functioning of a program.

It is a structured language; such languages represent a major improvement for programmers who want to predict the behavior of a program more easily. It is much easier to understand the function of an IF...THEN...ELSE structure than to trace GOTOs and statement labels to remote, unpredictable places in a program. Pascal has most of the structures necessary to write a completely structured program without GOTOs. Some dialects of Pascal implement all the necessary structures; all of them allow for more complete structuring than FORTRAN 77 or the semi-structured dialects of COBOL.

Pascal is strongly typed. The "type" (floating point, integer, set, record) of a variable is traced even through procedure calls, while a language like FORTRAN only checks the type through the current local routine. This helps in detecting a major class of programming errors. Pascal, like other recent languages, requires the explicit definition of all variables as a guard against introducing a misspelled variable.

The Pascal standard includes an input/output package. This is important for a language intended to be used in textbooks, but fixes the style of I/O that can be done from Pascal.

Pointers and records give the high-level language programmer access to powerful techniques that were formerly only available to Assembly language programmers; thus, complicated data structures like linked lists and trees can be handled explicitly in Pascal. In a language like FORTRAN, these structures would have to be "simulated" inside an array with the structure diagrammed either in documentation or inside the programmer's head.

Currently, there are many implementations of Pascal. There are several stand-alone compilers that run under various operating systems. There is also an operating system written primarily in Pascal, called the p-System. The p-System is availabe on a wide range of computers, so programs written in Pascal are highly portable.

Pascal Animation Package* Allows you to generate animated graphics easily and fast. Using a specially created binary input/output system, you create sets of images that can be treated as character fonts. Contains a number of helpful programs. Apple Computer, Inc.

Pascal Animation Tools* Use Pascal to create animated figures quickly and easily. A series of still figures can be linked together to give a simulation of movement. 48K. Apple Computer, Inc.

Pascal Disk* Use in conjunction with Thunderclock Plus and Apple II Pascal system for a complete Pascal programming kit. Demonstration programs and User Manual introduce you to Pascal and its uses with the Apple. Thunderware, Inc.

Pascal Graphics Editor, The* Perfect for the professional who wants advanced graphics editing and the ability to define character sets of styles and sizes. This total editing package also has utilities to use in your own programs to draw triangles, parallelograms, saving or moving blocks, and loading pictures to disk or arrays. Sirius Software.

Pascal Interactive Terminal Software* Use your Apple II (and D.C. Hayes Micromodem II) as an intelligent terminal to communicate with other systems via telephone lines (110 or 300 baud ASCII). While connected, this package maintains a 24K copy buffer from which you can store data to disk as a standard Pascal text file. Data can be simultaneously printed while it passes through the modem. You can leave and return to the program without losing the modem connection. P.I.T.S. has been extensively tested on a wide variety of timesharing systems. Micro Software Systems.

Pascal Language System See Pascal.

Pascal Learning Aids* This disk contains sixty programs of progressive complexity that can be used as an adjunct to a high school or college Pascal course. The manual includes listings of each program. Tables are included that show which Pascal concepts are demonstrated in each program. Apple Pascal System. 64K. Minnesota Educational Computing Consortium.

Pascal Programmer* Utility program that makes Pascal programming easier. Allows for fast record retrieval from disk, while providing a variety of functions designed to help develop application programs and assist with programming problems. Modules include Sorting and Searching, disk file access, report and display, and disk copying. 64K. Solidus International Corp.

Pascal Tools I & II* Both of these packages are extremely useful for handling large programming tasks. The first package is for text files; the second is for binary and code files. Advanced Business Technology, Inc.

Pascal Transcendental Routines* Utilize the capabilities of the AM9511 on Computer Stations' Fast Floating Point Board (#7001) with Pascal. Computer Stations, Inc.

Pascal Utility Micromodem Package (PUMP)* Facilitates using the D.C. Hayes Micromodem with Apple/UCSD Pascal. Documentation includes source listing of the functions and a couple of sample programs to illustrate PUMP's use. Micro Software Systems.

Pascal Utility Package* Three programs: PUP1 moves BASIC files to a Pascal disk and produces listings of Pascal text files. PUP2 moves Pascal text files and can modify bytes from a BASIC or Pascal disk. PUP3 moves CP/M files to Pascal and modifies bytes from a CP/M or Pascal disk. Features full user documentation, on-line user assistance, user friendly design, upper and lower case, easy-to-understand error messages, Pascal wildcards, single-or multi-drive operations, and 40/80 column board. Supersoft Associates.

Pascalgraphics (formerly Pascal TigerGraphics)* A graphics dump to printer for those using Pascal. Dump to printer routine can be added to user's Pascal library as an intrinsic function. Printers supported with Pascal Graphics are:

7505 PascalGraphics for the IDS Paper Tiger 440g/445G
7562 PascalGraphics for the IDS Paper Tiger 460G/560G
7586 PascalGraphics for the Epson Mx-80/MX-100
7596 PascalGraphics for the Anadex 9501/9500

Computer Station, Inc..

Pass Make information from one process or program available to another process or program. Similar to a football pass, except that one or more bytes of data replaces the football, and the receiver is a program. The sender may be a program or a person typing the data onto a command line to be passed to a program. The two most common examples would be DOS passing parameters from the command line to a program and a BASIC program passing variables to a subroutine.

PASS* Professional Authoring Software System. Allows for the creation of author-designed lessons. Students receive an individualized lesson which helps them learn material at their own pace. Consists of four components: Authoring System, Presentation Systems, Management System, and Reporting System. Personal Computer Center.

Passport Analog Synthesizer Card* A synthesizer card that comes with music operating software to draw envelopes, contours, and realtime modulation. There are thirty-two preset sounds with a six-voice polyphonic sequencer, three oscillators, three low-pass filters, and three amplifiers on each card. 48K. Passport Designs, Inc.

Password Used for identification and security purposes on a computer system. Each user is assigned a specific set of alphanumeric characters to gain entrance to the entire computer system or to parts of the system.

Patch A band-aid solution for debugging or alteration of a software program. A section of code is inserted into the program which changes the control functions of the program. Commonly used patches include DOS patches (see Renumber) and printer control patches for a word processor.

Pathnames Pathnames are used in Apple III SOS to access specific files within the hierarchical file structure used by SOS. To understand pathnames, the file structure itself must be understood. The primary level in the file structure is the disk which is called the volume and is given a volume name. An example of a volume name is Investments. The next level in the file structure is a directory which contains files which are related generally to each other.

Examples of directories in the volume called Investments are Real Estate, Stocks, Bonds, and Commodity Fund. The subdirectories in Real Estate could be Industrial, Undeveloped, and Residential. The subdirectories in Stocks could be Common, Preferred, and Options. The subdirectories in Bonds could be Corporate, Federal, and Municipal. Prefixes which could apply to files in all of the subdirectories and directories could be Longtermhld and Shrttermhld. Local names for files within the subdirectory Common in the Stock directory could be Pepsico.3.7.77, Apple.4.8.83, and Rjreyn.8.2.79. Local files can be accessed by using a pathname which consists of the volume name and a series of local file names preceded by a slash and containing no spaces. These files can also be accessed by a partial pathname which consists of a prefix and a local file name. An example of the use of a pathname would be :

```
/INVESTMENTS/PEPSICO.3.7.77/RJREYN.8.2.79
```

An example of a partial pathname would be:

```
LONGTERMHLD/RJREYN
```

Pause To freeze the screen briefly while the operator using your program reads a message, just write a delay loop after you print the message:

```
1000 FOR Y = 1 TO 2000
1010 NEXT Y
```

To freeze the screen until the operator is done with it, put in a dummy input statement and instruct the operator to press RETURN to proceed. The input variable need not be used in your program:

```
1000 INPUT "Press RETURN to continue";A$
```

Paymaster* Whether you pay your employees once a week, once every two weeks, or once a month, this program will calculate the payroll. It takes out all deductions and can automatically deposit funds to individual accounts. Handles up to one hundred employees. Monument Computer Service.

Payroll* Provides an easy-to-use method of monitoring employee records as required by federal, state, and local law for all fifty states and the District of Columbia. Complete personal employee files are maintained. All tax tables and rates are alterable, at any time, by the user. When such changes are made, previously deducted amounts are corrected. When checks are to be generated, employees can be called by name, department, or pay period; the personnel files are automatically updated to show the current quarterly and year-to-year totals. Payroll, which is marketed as part of Continental's Computer Programmed Accountant system, may be used as a stand-alone program, or may be integrated with Continental's General Ledger* program. 48K; two disk drives; DOS 3.3. Continental Software.

Payroll* This stand-alone company payroll software maintains employee records including insurance, tax, and other deductions. Disk contains the most recent tax and Social Security formulas. Creative Discount Software.

Payroll* Calculates all tax deductions for up to 300 employees. Paychecks are printed and W-2 forms are issued. Broderbund Software.

Payroll* Deducts tax amounts, prints paychecks, and stores applicable data. Centronics 739 printer with grappler. Sound Software Systems.

Payroll* Allows for calculation of hourly/salary paycheck. Computations include tax deductions, overtime, and bonuses. Paychecks, payroll check register, current earning register by department, 941A forms, W-2 forms, and pre-list audit trail are printed. Computer Products International, Inc.

Payroll for the Apple II Plus* A menu-driven payroll program which is easily adaptable to customer specifications. The user can also change the tax rates used by the program as well as run simulations without having to replace permanent records. Handles several pay structures, a variety of deductions, tax forms, periodic reports, employee records, and more. Alternative Software, Inc.

Payroll Module* Designed to fill all payroll needs, this program prints checks and the check register, produces quarterly reports and year-end W-2s, departmentalizes payroll costs, tracks payroll and personnel data. Flexible for each state tax code, allows for unique deductions, and can be modified for weekly, bi-weekly, and semi-monthly payroll periods. Data Systems, Inc.

Payroll Package* Maintains a journal of cash disbursements, generates a deduction register, keeps employee records, and figures payroll while automatically deducting tax witholdings. The program will generate payroll reports and employee tax forms too. Software Technology for Computers.

Payroll Software Packages The payroll packages listed below will all perform a minimum of payroll functions for the user. All keep track of periodic payrolls and employee information relating to that payroll. In addition, some of these packages generate various types of reports for management use, as well as W-2 and 941 forms. Contact the vendors listed on the next page for more information regarding specific program capabilities.

Program Name	Vendor
Advanced Payroll Package	Software Technology for Computers
Apple Payroll System	Computer Products International, Inc.
Apple Controller Business Package	Computer Products International, Inc.
Business -Volume 2 (Payroll)	Minnesota Educational Computing Consortium
MICA/PR	Micro Associates
Pakre Payroll Package	Pakre, Inc.
Paycheck 1	Charles Mann & Associates
Paymaster	Masterworks Software
Paymaster	Monument Computer Service
Payrecord 1	Charles Mann & Associates
Payroll	Continental Software
Payroll	Broderbund Software
Payroll	Computer Products International, Inc.
Payroll	Creative Discount Software
Payroll	Peachtree Software
Payroll	Facts Management Systems, Inc.
Payroll	Kleinhammer Business Software
Payroll	Wilson Jones
Payroll Ledger	Computer Research, Inc.
Payroll Management-Payroll Accounting System	Computer Research Inc.
Payroll System	BPI Systems
Payroll System	Bob Sevedge
Payroll 1	Charles Mann & Associates
Payroll/Personnel	Compumax
Superfast Payroll	Softwand Software
Total Payroll	TCS Software
TPS Canadian Payroll System	Time Proven Systems, Inc.

Payroll System* A highly user-programmable payroll system that includes full listings in BASIC, changeable tax tables, and complete file layout documentation. This program has a repertoire of nearly 150 payroll functions, maintains complete employee records, and is capable of calculating all sorts of special case deductions and pay schedules on one payroll. Single and dual disks. Bob Sevedge.

Payroll/Cost Distribution System* Calculates payroll and taxes, as well as other deductions; designed to handle large payrolls at a variety of separate locations. The menu-driven selections for system operations include hours worked, the employee master file, payroll calculation, and payroll tax reports. When the fiscal year ends, the system sets up a new payroll records system while transferring all pertinent employee data to avoid tedious data reentry. Arken & Associates.

Payroll/Personnel* A six-part payroll and personnel records system that includes the following functions: 1) initializes and updates records in the master file, performing master file restart at the end of a fiscal year, 2) initializes and updates payroll files, 3) lists and prints master file and payroll records, 4) updates the journal, computes payroll and prints the register and checks, 5) generates annual W-2 forms, quarterly 941s, and reports on job costs, 6) lists any combination of employee histories. Compumax.

Paysystem Accountant* A system for small businesses that can assist with accounting and payroll tasks. Some of the features include an entry element that will post and print checks, an entry element that can change the account structure, a summary report system, an audit trail for complete transaction records, and report and tax calculation. Applesoft II. Monument Computer Service.

PC Program Counter, or Printed Circuit, or Personal Computer.

PDL BASIC Statement. Returns the current value, from 0 to 255, of the indicated paddle connected to the Apple through the I/O port. The format is:

```
PDL(<n>)
```

<n> equals the number of the paddle; 0 through 3 are valid arguments. You may use this in either the immediate or deferred mode. In the immediate mode, enter:

```
PRINT PDL(<n>)
```

In the deferred mode, enter:

```
<x> = PDL(<n>)
```

<x> is a variable to be used in the program.

PDP—Program Director's Planner Package* A four-program planning package which computes effective time allocation for music, news reports, advertisements, and more. Media Service Concepts.

PE Parity Error. If the parity status bit goes to 1 in odd parity or 0 in even parity, an error is produced, a flag set, and hopefully a message is displayed.

Peachtext (Magic Wand)* A CP/M-based word processing program that includes a Master Menu and has very good documentation. Other featured programs are Spelling Checker, Mailing List, and Data Transmission. 48K; CP/M; Z-80; 80-column board. Peachtree Software, Inc.

PEEK BASIC Function. PEEK function returns the byte read from the indicated memory position. The format is:

```
<variable> = PEEK(<n>)
```

<n> is an integer in the range 0 to 65536. <n> is the address of the memory location to be read. The value returned is in the range 0 to 255. See POKE.

Pen Color In Apple III Business BASIC, colors used for plotting points, lines, and background are controlled by the BGRAF.INV module of the Graphics Driver. The color of dots and lines which are plotted on a background is controlled by pen color.

Pen Color Code The pen color code used by the Apple III is specified by setting a screen control code in the Graphics Driver. The pen color code is called by using its value, ASCII 19. The color is then set by providing the appropriate color code. The color code for light blue is 7. Thus, if the user wants to set the pen color to light blue, he enters the following commands with the Graphics Driver:

```
120 SETPEN = 19 : LIGHTBLUE = 7
125 PRINT#2;CHR$(SETPEN);CHR$(LIGHTBLUE)
```

Pen Line Feed Code The Apple III Graphics Driver provides the means for moving the graphics pen (cursor) to various points on the screen through the use of screen control codes. The screen control code which causes a line feed is an ASCII 10.

Pen Pal* A text editor that features some of the functions of a word processor, but is limited to a 40-column screen on the Apple II/II+ with the words splitting at the end of the line as in Applesoft programming. It is possible to display the material (in the Look mode) in the way it will be configured when printed, but this would take a rather long time to get used to. The Videx 80-column board is not recognized; the initial screen is filled with dots (indicating a space for each character), which is very distracting. Howard W. Sams.

Percent Concentration* Poses questions covering percent and fraction concentrations of randomly derived chemical solutions. Microphys Programs.

Percent Problems* Gives practice in computing percentages. Various levels of difficulty. 32K. Indian Head Software.

PerfectData Micro Maintenance Kit* A general purpose microcomputer care kit that provides the necessary cleaning supplies for the small business computer or personal computer. It is intended for periodic preventive maintenance and cleaning of flexible disk drives, tape drives, CRT screens, printers, and keyboards. Included in the kit are a flexible disk drive head cleaning diskette and special cleaning solution. It also contains CRT screen cleaner, cleaning wands, lint-free cloths, a brush, and anti-static spray to protect sensitive circuits from damage caused by static charge. An instruction book explains the use and benefits of each component and assists the user in planning an effective preventive maintenance program. Innovative Computer Products.

PerfectData Tech Maintenance Kit* Provides the proper materials to clean read/write heads, guides, capstans, tape paths and other working components of magnetic peripheral devices. Each kit contains ICP's proprietary cleaning solution, dispenser cap, lint-free cloths, and special constructed cleaning wands. Innovative Computer Products.

PerfectData Type Element Cleaning Kit* A simple, practical, and low cost way to clean printwheel type elements found on the majority of today's information-processing printers. Innovative Computer Products.

PerfectData Video Display Cleaning Kit* A kit recommended for cleaning terminal screens and keyboards. Contained in the kit are two four-ounce bottles of video display cleaning solution, pump spray dispenser, and fifty cleaning cloths. The solution contains a static neutralizing agent which prevents build-up of electrostatic charges that attract dust and dirt. The cleaning cloths are specially designed to eliminate foreign particles and contaminants without scratching plastic surfaces. Innovative Computer Products.

PERFORM An Apple III Business BASIC command which causes the computer to execute the Machine language subroutine whose name immediately follows. (The Machine language subroutine must have been loaded by an INVOKE command, prior to using the PERFORM command.)

Performance Manager* A program for managers who want to do monthly analysis of performance data. Works on income or expense for various budget categories, production levels, and performance levels (dollars or sales). A quick and easy way to generate complete reports. 48K or 64K. Aurora Systems, Inc.

Period (.) Extension Name Delimiter (CP/M). In a file name, the : and . are specified to delimit drive name and extension respectively. Parameters on DOS commands can be delimited (separated) by these characters: space, comma, semicolon, equal sign or tab key.

Period Attendance System* For use with the SASI Basic Applications System. This eleven-program package handles all attendance record-keeping needs. Information can be put directly into the computer through a CRT terminal, or read in from hand-written sheets with a SCAN-TRON system. Comprehensive and detailed records can be kept and easily accessed to generate various reports. Educational Time Sharing Systems, Inc.

Peripheral Any external device connected to a computer and controlled by it.

Peripheral Board Serial/Parallel I/O* As the name implies, this board can be used to interface to serial and parallel devices. Features: all gold connectors/sockets, RS-232C, 50-19.2K software-selectable baud rate, crystal-controlled; ninety-day limited warranty; and driver software with documentation. Bird Corporation.

Personal Accountant* Keeps records of your home expenses. Recalls anything from account balances to itemized deductions. Monument Computer Service.

Personal Accounting System* Prepare your itemized tax deductions while keeping track of your expenditures. Your checking account is incorporated into the system, allowing for constant updating. 32K. Charles Mann & Associates.

Personal Accounting System* Compute your IRA and Keogh deductions in preparation for end-of-the-year taxes. Records deductibles and other expenditures. Creative Discount Software.

Personal Aid to Learning* The master diskette controls all the program diskettes in this series. You also need to install a lowercase chip which will allow the Apple II/II+ to generate lowercase letters on the screen (which are akin to the material the child is seeing in school). The instructions for installation are very clear. You must also use a Keypatch Machine language program if you wish to use the lowercase display with programs other than the PAL system. The master diskette, the lower case chip, and binder are supplied in the various grade levels and other learning packages.

The program is heavily disk-dependent, so the disk must never be removed from the drive unless you are directed to do so. With only one disk drive, you need to exchange the Master Disk for the Discovery Disk or Learning Disk more often than if you have two disk drives. The responses to wrong answers are excellent, and the help is detailed. You have the option of working on any of twenty-forty different objectives for any lesson. Those for which you have already answered four or five questions correctly will be marked MASTERED on the list of objectives; those for which you have answered three or fewer questions correctly will be marked TRIED; all others will be marked NOT TRIED.

This program is designed to be used either for home or school learning. When used in a classroom, records for up to fifty students may be maintained. For classroom use, it is possible to get group reports, listing all students who have mastered a particular objective, all those who have tried but still need more work, and those who have not yet tried that objective. To get these reports, you need a printer; without a printer, look at the menu for each individual child which will display the same information. Universal Systems for Education, Inc.

Personal Bookkeeper* This mini version of the KBS Job/Cost Accounting programs is designed for individual and small business needs. Enter transactions once, and they are automatically posted to the appropriate reports. You can process 150 entries per batch, 150 chart of accounts, and 100 job items. Kleinhammer Business Software.

Personal Calendar* A computerized appointment book. This one, in addition to normal datekeeping, comes with automatic calendar generation to help with your scheduling. It can print any month from 1901 to 1999! Educational Computing.

Personal Computer Generally, a single-user computer system which is inexpensive and can fit on a desktop.

Personal Datebook* An electronic appointment book. This program is designed to be used by an individual or by as many as nine people. One calendar is shown at a time. Digital Marketing.

Personal Expense Record* Create eleven budget categories for year-to-year comparisons of spendings/savings. The results may be plotted on a colorful graph for easy display. Includes an Instruction Manual and a sample program. 16K; cassette or disk. Wise Owl Workshop.

Personal Finance* A checkbook management program that also produces amortization tables. Golway Computer Enterprises.

Personal Finance Manager* A complete family budget planner. You can plan a personal budget while taking various expenses into account, such as credit card exchanges, bills, bank service charges, and taxes. You can also request monthly or yearly summaries for analysis. 48K. Apple Computer, Inc.

Personal Finance Master* Includes everything you need to balance your personal finances. Keeps current data on all your money accounts from checking to complicated investment calculations. Printed reports, checks, and labels are available. Spectrum Software.

Personal Habits for Job Success* Develop good personal habits that will contribute to your success on the job. Mesa Research.

Personal Secretary Package* A good package to organize your desk, your office, and your time. Flexible enough to accommodate specific information management needs; handles phone numbers, records, appointment calendars, and more. Items are easily retrieved, and functions include a daily planner and daily summary of work accomplished. 4K minimum, 8K recommended; Integer BASIC. Charles Mann & Associates.

Personal Shopping List* An automatic shopping list with two hundred pre-defined items and room for up to five hundred more. Educational Computing.

Personal Tax Plan* A tax advisor for the Apple. Many tax questions can be answered with a "what if" format by inputting variable data and comparing the results. It is easy to use and print all fact sheets. Aardvark Software.

Personal/Home Use Software See Agenda Files; Apple Alarm; Apple Menu Cookbook; Apple Trac; Asset Manager; Astroapple; Astroscope; Auto Atlas; Auto Records; Auto Rental Management System (A.R.M.S.); Bank Account Manager; Banner Magic; Basic Individual Retirement Account; Becoming an Informed Shopper; Biorhythm; Biorhythm Compatibility Analysis; Biorhythms; Bird Classification Program; Blackjack "21" Strategy; Bonds; Breaking Away; BudgetKEYper; Buying Wisely; Calorie Counter; Capital Investment Analysis; Capital Needs Analysis; Cash Versus Credit Buying; Cash-Flow Analysis; CheckWriter; Chequemate; Claim to Fame & Sports Derby; Coin Collector Catalog, The; Color Calendar; Composites & Relationships (An Astrology Program); Compu Cube; Computer Cajun Cuisine; Creativity Life Dynamic Package, The; Cycle Graphs; Decision Master; Diet Analysis; Disk-O-Check; Eliza; Energy Miser; Estate Tax Plan 1.2; Estate Valuation Analysis; Executive Fitness; Eye, The; Family Bible Fun; Family Budget Analysis; Family Financial Planner; Family Records Temp—A VisiCalc Template; Family Roots (Lineage Program); Family Security Needs Analysis (FSNA); Field Companion, The; Filling Out Job Applications; Finance I; Financial Analyzer; Financial Management System III with Checkwriter III; Financial Partner; Financing A Car; Find the Key; Five Minute Financial Check-Up; Formulex; General Accounting Package; General Ledger (six vendors); General Natal Package; Good Health Habits; Grocery List; Hayes Federal Tax VisiCalc Tax Templates; Health Maintenance Volume 1; Health Maintenance Volume 2; Health-Aide; Heliocentric Horoscope; Home Accountant, The; Home Finance Pak I; Home Finance Program; Home Health Disk; Home Inventory File; Home Money Minder; Home Safe Home; Home—I; HomeTemp—A VisiCalc Template; Honesty Test; Horoscope in Mundo; House Comparison with Relocation; How to Operate the Apple IIe; How to Operate the Apple II Plus; Hyper-Typer; Ican; I-Ching; I-Ching (An Astrology Program); Improving Your Memory; Individual Tax Plan; Individual U.S. Income Tax Package; Individualized Planning System; Intelligent Investor Series 1; Interlude; Job Readiness-Assessment and Development; Job Readiness Attitude Assessment; Know Yourself; Life Expectancy; Lineages; Loan Amortization Schedule; Lucky Day

Numerology Report; Lucky Lottery Report; Lunar Returns; L.U.S.T.; Machinery Management Series One; Mail List Manager; Managing Your Time; Marching Band Database; Memominder; Menu II, The; Menu Planner; Micro Memo; Micro Tax/Series; Micro-Atlas; Microfinesse; Mind-Memory Improvement Course—Step 1; Mind-Memory Improvement Course—Step 2; Mind-Step 1; Mind-Step 2; Mortgage; Mostly Basic Household Program Package; Name & Address; Natal Horoscope; Natal Horoscope Package; Nutri-Pack; Nutrichec 2.0; Nutritionist; Oil and Gas Companion; Personal Accoutant; Personal Accounting System; Personal Bookkeeper; Personal Calendar; Personal Datebook; Personal Expense Record; Personal Finance; Personal Finance Manager; Personal Finance Master; Personal Habits for Job Success; Personal Secretary Package; Personal Shopping List; Personal Tax Plan; pfs Personal Filing System; Phone Directory; Pizza Program (Dinner Menu Planning System); Poison Proof Your Home; Print Check Accounting System 1; Professional Disk; Programmed Exercises; Progressed Horoscope; Progression Package; Psychotherapy; Q-Card; Quikdirt—Cash Replenishment; Q-Pon Helper; Real Estate Analysis; Real Estate Analysis Package (REAP); Recipe File; Recipe Handler II; Reminder Calendar; Rent vs. Buy; Resources for Job Hunting; Retirement Planner, The; Roadsearch; Sex-O-Scope; Sexuality Life Dynamic; Solar & Lunar Returns; Successful Job Interviewing; Super Bar and Wine Guide; Tax Advantage; Term/Whole Life Comparison; Tomorrowhouse; Total Sales; Vimshottari Dasas; Vitafacts Series; Wood Heat; Work Habits for Job Success; 8K Natal Package; 16K Professional Package .

Personnel Office* Keeps track of all employee information. Standard government tax and other formats are included. Monument Computer Service.

Personnel Record Program* Tracks your employee personnel records in compliance with Federal and state laws. You can enter data on your employees' positions, education levels, sex, race, and ages to comply with Equal Employment Opportunity regulations. 16K. Charles Mann & Associates.

Pescando Respuestas, Adicion* "Fishing for Answers, Addition," in Spanish. Verse and graphics are wonderful. Kindergarten through grade two. Applesoft. NTS Software.

Pescando Respuestas, Adicion* "Fishing For Answers, Addition," (level 2), in Spanish. For grades two through four. 32K. Applesoft. NTS Software.

Pescando Respuestas, Substraccion* "Fishing for Answers, Subtraction," in Spanish. Kindergarten through grade two. Applesoft. NTS Software.

Pescando Respuestas, Substraccion* "Fishing for Answers, Subtraction, (level 2) in Spanish. For grades two through four. 32K. Applesoft. NTS Software.

pfs:File* A popular file management program with different versions for the IIe and II/II+. You can design your own file or form; you must store different files on different data diskettes. You may store up to 1000 records on a single data diskette. You may store data in the form of text, rather than single lines of information, so the file may be used for abstracts of articles, as well as the more conventional address file types. When you store the information as text, you may also store keywords to retrieve the information at a later date.

The package comes with two program diskettes, which cannot be copied. The program is coreloaded; i.e., once the program is loaded, the protected program diskette may be removed from the disk drive, and all further work will be done in memory or with the data diskette. The manufacturers recommend the use of double-density diskettes to ensure accurate recording of information.

In addition to search and update functions the program can print a hard copy of your information and can edit files. 48K. Software Publishing Corp.

pfs:Graph* Different versions of this program are available for the II/II+ and the IIe. Works with pfs* or VisiCalc* DIF files to create line graphs, bar graphs, and/or pie charts. Because of the pictorial nature of the output, only certain printers/plotters may be used: Epson printers with Graftrax option, the Apple Silentype printer, a Centronics-compatible printer connected with the appropriate Grappler interface card, and the HP 7470A Graphics Plotter (option 001-RS-232C only). The appendix dealing with these printers (in the pfs:Graph Manual) specifies how to use them with the program.

You first need to get and edit data from your pfs or VisiCalc files; you may then design and display the chart on the video screen. At this time, you may also add legends and titles to the chart and create horizontal grid lines for a bar or line graph. You can display the graph in color on the monitor and on some compatible printers. You may save these charts to a data diskette and redisplay them at a later time. If you wish to use them in a business presentation, it is possible to use a projection screen TV for your monitor (see Sup'R Mod). Software Publishing Corp.

pfs:Report* Allows you to generate tabular reports using your pfs:File information. In addition to the system requirements for pfs:File, you will probably need two disk drives (though the program can work in a limited way with one drive). The report may be printed out using only those forms with a specified keyword; it may also include calculations on the columns, including total, count, and average, plus sub-categories of each of these for column #1 changes. Calculations may be made with derived columns in which you perform numerical calculations on one column of information to create another column.

You may pre-define report formats for reports which you wish to generate more than one time; a maximum of eight such pre-defined formats may be stored for any one pfs file. The default values for column heads are the item names in your pfs file form; however, you may change these column heads for the report, if you wish. The manuals for this entire series are clear and well-indexed with appendices for quick reference. Software Publishing Corp.

PGS (Professional Graphics System)* A system that generates text and graphics, has built-in transparent pixel capability, 256 by 241 point resolution, provides eight basic colors, contains its own power supply, and can be expanded with options. Also features programmable text fonts, broadcast quality, closed caption features, and video overlay and animation. Fully adjustable. Symtec, Inc.

PG1000 Color Printer* The PG1000 is a color printing system using silent ink-jet technology. Precision images containing over 125 shades of color can be produced on standard computer paper. The specially formulated ink is contained in a snap-in, disposable cartridge. The PG1000 package includes printer interface hardware, cables, software drivers, 500 sheets of paper, and ink cartridge. Printa-Color, Inc.

pH Concept* Poses chemistry questions covering pH and pOH concepts. Microphys Programs.

Phase Measured in degrees, the phase is the difference between the 0 crossing point of a reference waveform and that of the measured waveform.

Phase Locked Oscillator (PLO) A circuit which is phase-locked to recover data in a floppy diskette drive controller. The PLO steadies the separate data and clock bits.

PHD* A hard disk for the Apple III. It has ten megabytes of storage capacity and five MB backup. There is also room for expansion to a twenty MB configuration. Xcomp.

Phone Directory* List people, companies, and phone numbers. Video World.

Physical Science Baseball—Chemistry* A hi-res game to help students learn basics of junior high school chemistry. The program explains the correct answer when the student goofs. J & S Software.

PIC Priority Interrupt Controller. A chip which manages interrupts and gives vectored interrupt capability to an MPU which does not have this feature built in.

Picture Buffer The video display, which appears on the monitor screen of an Apple II, Apple II+, or Apple IIe computer, is generated from information stored in the Apple's random access memory. In low-resolution graphics mode, a memory space of 1024 locations is reserved for use by the low-resolution graphics screen and a coresident text display. In high-resolution graphics, an area consisting of 8192 memory locations is reserved for use in plotting high-resolution graphics data. These areas of memory set aside for graphics are sometimes called pages or picture buffers. See Screen Pages.

Picture Library* A twenty-nine disk package designed for students between kindergarten and twelfth grade. Disks on cartoon animation, graphics, animal pictures, etc. Approximately 1,000 figures in all. 48K. Ties Minnesota School District.

Pie Writer* A word processor with incremental spacing, formatted output, automatic wrap-around, global word search, and most other standard options. Easy to use, fast, and powerful. Hayden Book Company.

Piece of Cake* Another program in the series known as Early Games. Features math games with the theme of a bakery and a cake. In Bakery, a story involving baking and selling cakes teaches addition and subtraction. In Multicake and Dividacake, the player needs to compare how many pieces will be gained from a particular number of cuts vertically and another number of cuts horizontally; or how many vertical cuts are needed to yield the specified number of pieces, given the number of slices already cut.

Catchacake is an arcade-type game, where all four types of math problems must be solved before a cake hits the floor of Fumble's Bakery! This game may be played solo or by up to four players. The most difficult of the games is Flashcards, for which you may choose the type of problem and the level of difficulty. Multiplication at the Supermath level is extremely difficult, as the problems are all two digits multiplied by two digits. The student may work them mentally (three chances are given before the correct answer is displayed) for training in estimation, or they may be worked with paper and pencil with the correct answer typed in. The answer must be entered in order from left to right, rather then the way multiplication problems are usually done (this does not reinforce other learning methods). Counterpoint Software, Inc.

Pilot Animation Package* Allows you to write complex graphics programs, build and edit special data files of images, manipulate shapes with simple statements, and easily command frame-by-frame options. The package also includes Maxwell (demonstrates the simplicity of Pilot animation), Hormuz and Dr. Memory (sample Pilot lessons), and Immediate (allows you to review your animations on the spot). Apple Computer, Inc.

Pilot Animation Tools* Create animations in "snapshot" sequence. Once combined, the result will be a simulated motion picture. Each character may be edited, altered, and saved. 48K. Apple Computer, Inc.

Pin-Compatible Computer systems which have integrated circuits with leads or pins with identical functions.

PIP PIP is the acronym for Peripheral Interchange Program. This is the CP/M program used to copy files and programs from one disk to another, to copy the contents of an entire disk to another disk, to copy a file to an external device such as a printer, to concatenate files, to control printed line length, to format printed output into pages, to read a file up to a particular point or word, to print text on a page in a particular format, and to print a series of files using one command. The formats of the various PIP commands are listed below:

Copying Files:

```
PIP A:COPY WAGES = WAGES1
```

This command line transfers a file called WAGES from drive A to drive B and names the new file WAGES1.

Copying Several Files:

```
PIP
: = A: WAGES.BAK
: = A: EMPLOYEE. TXT
: = A: HOURS
```

This method uses PIP to move a series of files from drive B to drive A. The asterisk in front of the prompt indicates that PIP is working (the asterisk is the prompt for PIP).

Copying Files of One Type:

```
: PIP A: = B:*.BAK
```

This method uses PIP to copy all files with the extension .BAK from Drive B to Drive A.

Copying an Entire Disk:

```
: PIP A: =B*.*
```

This method uses the wildcard between two asterisks to signify that all of the files on the disk should be transferred.

Printing a File:

```
: PIP LST: = WAGES
```

This command causes the contents of the WAGES file to be listed to a printer.

Concatenating Files:

```
: PIP
*PAYROLL = WAGES.HOURS.EMPLOYEE
```

The command used in this fashion joins the three files on the right.

PIP can be used with specific parameters. These parameters consist of one letter abbreviations enclosed in brackets after the name of the file being acted upon. These parameters are listed below with a brief description of their purpose.

PARAMETER	FUNCTION
B	Hold to be transferred to a block device in buffer until device signals readiness to receive file.
D<n>	Delete all characters beyond horizontal position "n" on every line.
E	Display file transfer on screen while it occurs.
F	Do not transfer form feeds with file.
H	Verify that HEX data in HEX file being transferred is in right format.
I	Do not transfer ":0" HEX records.
L	Convert upper case to lower case during transfer.
N	Place line number on each line.
O	Continue concatenation after end of file is encountered.
P<n>	Advance to top of form each "n" lines.
Q	Quit when specified string is found.
S	Start copy when specified string is found.
T<n>	Tab to horizontal position "n".
U	Convert lower case to upper case.
V	Verify that transfer was successful.
Z	Clear parity bit for input from external device.

Pip I* A data management system for managing personal assets. Works on depreciation costs, current values, replacement values, and analysis by year of purchase. Cassette. Nibble.

Pip II* Similar to Pip I, but comes on disk. Nibble.

Pitch Drills with Accidentals* A package that drills names of lines and spaces for treble and bass clefs. A pitch game and pitch transposition exercises are included. 48K. Micro Music, Inc.

Pitch Drills without Accidentals* A package that visually drills names of lines and spaces in treble and bass clefs. A pitch game and exercises in pitch transposition is included. 48K. Micro Music, Inc.

Pitch Drills without Accidentals* A series of music programs that can be used in visual drill form. Includes the names of lines and spaces in the treble and bass clefs, a pitch game, and pitch transposition tutorials. Requires an MMI DAC Board. Rainbow Computing.

P.I.T.S.* Turns your Apple II running Apple/UCSD Pascal into an extra powerful terminal. P.I.T.S. enables you to connect your Apple to any computer system and copy what you want, save it on disk, or print it out. It is compatible with Hayes Micromodem II or an acoustic modem, and one of these interface boards: Apple's Communications Card, California Computer Systems' 7710A, SSM Microcomputer Products, or AIO (TM) from Microcomputer Products. Software Sorcery, Inc.

Pixel A dot on a video graphics display which is an element of the visible picture.

Pixel-Plexer* An integrated circuit modulator-RF oscillator module that can multiplex and interface color and luminance video signals plus audio from a variety of computer and electronics equipment. Features blank channel operation, printed circuit RF coil, accepts analog and digital signals, 3.5 Mhz color subcarrier oscillator, and 4.5 Mhz audio subcarrier that includes varactor diode modulator for FM sound insertion. ATV Research.

Pixel-Verter* A modularized oscillator which can convert a TV into a video monitor. The addition requires no wiring modifications of the television receiver. This totally transistorized device is very small and can be mounted inside a video camera, VCR, or monitor. Circuitry includes variable input gain control to adjust for digital or analog signals. ATV Research.

Pizza Program (Dinner Menu Planning System)* Choose what you wish from the food groups in this system. Add or delete foods as you desire. Enter your favorite restaurant as the main course and the computer will remind you to eat out. Also has a calorie counter. 48K. Gourmet Software.

Pkaso EP 12-80/100 Printer Interface Card* This printer interface for the Apple II/II+ or IIe and the Epson MX-80 or MX-100 printer enables you to manipulate your printer from a BASIC program using simplified commands. The following features are included: built-in print of the hi-res graphics screen including size control, rotation, left-, center-, or right-position horizontally on the page; inverse or direct printing; text screen dump; lo-res screen dump in eight different formats; half-tone gray scale printing; super-res dot graphics (960 by 264 pixels per 8″ by 11″ page); built-in tabs for column printing; and the ability to define your own character set.

The manual is not a tutorial, so some practice will be needed. Compatible with many popular software packages (VisiCalc*, WordStar*, AppleWriter 1.1*, and AppleWriter II and IIe*), although the limitations of AppleWriter in dealing with control characters make the defined character set a bit unwieldy.

Place Value* Test your ability to name place values to the right and left of the decimal point, and practice your understanding of rounding figures. 32K. Indian Head Software.

Places Everyone* An educational program for elementary school students in grades two through five. It teaches the use of decimals by requiring students to identfy the values of decimal places shown on the screen. 32K; DOS 3.2 or DOS 3.3. NTS Software.

Planes* Contains a library of 200 plane-dimensional shapes; new shapes can be added to the library. A shape is presented in hi-res, and the user is asked to draw the geometric shape from another perspective. The program is designed for straight line and/or point shapes, triangles, polygons, etc. 48K. ITC Technologies Corp.

Planet Accuracy* Offers a one second of arc accuracy for the sun, moon, and all of the planets. Includes Delta T correction input and Sidereal/Tropical option. Outputs ecliptic longitude, latitude, right ascension and declination in degrees, minutes and seconds. 32K. Matrix Software.

Planetary Guide, The* Explore the solar system using this educational software that beautifully illustrates planetary orbits and the phases of the moon in high-resolution graphics. Planet size and orbital relationships are visually demonstrated. Includes comets and asteroids, text explanations, and tables full of facts. Synergistic Software.

PlannerCalc* A simple-to-use, yet powerful, financial modeling program for use with the CP/M system. The program will compile a created command file and execute it to produce an on screen report. The user may print reports as values or command files. Files may be upgraded by MasterPlanner*. CP/M. Comshare Target Software, Inc.

Planning Cash Flow* Teaches small businesses about different aspects of working capital and cash flow. Educational Programming Systems.

Plants and How They Grow* Shows how smaller plants and trees start from seeds and grow. Discusses the different plant parts and what they do, as well as seed dispersal. Includes a pack of seeds and a game to test student comprehension. Disk or cassette. Right On Programs.

Plan80* Creates graphics displays of calculated depreciations, IRR, ATAN, and trig functions. This financial modeling system is extremely powerful and easy to use. 56K; CP/M. Digital Marketing.

Plan80* A powerful and flexible financial modeling program. With this system, developing a model is easy. You use simple statements to define the framework of your model, and enter data values and calculations to be made. You can format a variety of reports with your specifications, and access separate files as the program is running. This system can be used for any application that requires a worksheet, such as sales projections and analysis, inventory, taxes, and profit planning. All results can be displayed or printed and can be changed to answer your "What if?" questions. 48K. Apple Computer, Inc.

PLOT BASIC Statement. This command is used in the low-resolution graphics mode, which must be invoked by using GR first, in either the immediate or deffered mode. With the proper arguments, PLOT will turn on a rectangular spot on the screen. The format is:

PLOT <arg1>,<arg2>

The screen available for low-resolution graphics mode is 40 by 40 rectangles (called "dots" in the tutorial manual.) The first argument is the value of the X coordinate (from 1 to 40) and the second argument is the value of the Y coordinate. The color of the rectangle will be the most recent value of COLOR (q.v.) which is entered in either the immediate or deferred mode; it will be 0 (black), if not previously specified. Since the background color is black by default, you must specify a color for the rectangle, or make the background another color with FOR...NEXT loops.

Plot II* A plotting program which can handle up to nine sets of data for bar charts. User chooses from nine different shades of color. Computer Stations, Inc.

Plot Point Code The screen control code used by the Apple III Graphics driver to move the pen to a specified position and to plot a point—the ASCII value for 25 followed by the X and Y positions for plotting.

Plotter A computer-controlled mechanical device which draws images upon a screen or printer.

Plotting Graphs for Line Printer* Includes Cartesian plots, semi-logarithmic plots, and polar plots. Advanced Operating Systems.

Plotting Graphs for Video Display* Includes histograms, Cartesian plots, semi-logarithmic plots, log-log plots, and polar plots. Advanced Operating Systems.

Plug-Compatible Devices or components which use the same plugs and therefore can be used interchangeably without modification within the computer system.

Pointer A data item whose contents is the address of another data item.

Poison Proof Your Home* A program packed with information about poison, how to prevent poisoning, and what to do should someone you know be poisoned. 48K. MCE, Inc.

POKE BASIC Statement. The user may enter specific values or data into a particular memory location. POKE places a byte into a memory location. The format is:

POKE <n>,<m>

<n> must be in the range 0 to 65536. It indicates the address of the memory location where the data is to be written.

<m> is the data to be written to the specified location. It must be in the range 0 to 255.

The complementary function to POKE is PEEK. POKE and PEEK are useful for efficiently storing data, loading Machine language programs, and passing arguments and results to and from Machine language subroutines. BASIC does no address checking, so use caution when assigning address locations. (You don't want to POKE data in BASIC's stack or BASIC's variable area, or your BASIC program.)

Polar Graphing* Assists the student in learning about polar graphing and introduces polar areas. Includes the study of symmetry and polar graphs of the ellipse, hyperbole, and parabola. 32K. Math Software.

Political Party Mailing List* Help your local party or political organization keep up-to-date with members. You can add or delete names, print labels and phone lists alphabetically, and sort by party ID or age group. 3.2 or 3.3 DOS. Computer House Div/FLC, Inc.

Polling A technique whereby the status of each device is checked according to a schedule.

Poly Man* Polynomial manipulation with user specified names and degrees for up to twenty polynomials. Disk storage and retrieval and screen output or hard copy is possible with Smart Ware's Grafpak. 48K with ROM Applesoft, or 64K with RAM Applesoft, DOS 3.3. Smart Ware.

Poor Man's Graphics Tablet* Fifty-nine textures and almost unlimited colors allow creative users to draw geographic designs of their choice. Keyboard commands include copy, rotate, delete, merge, edit, and color. A special feature is included which allows the user to trace transparencies by plotting a few points and entering a command for the computer to trace the rest. 48K. Rainbow Computing.

POP A programming instruction where the last word is removed from the top of a stack.

Population Growth* Simulating a laboratory, students may carry out growth and population experiments in an attempt to calculate various rates and percentages. Includes instruction manual. COM Press.

Port A physical I/O connection, a port is an address providing a connection between the computer's internal processor and an external device. Ports are used to attach input and output devices.

Portfolio Evaluator* Calculates short and long term losses and gains, as well as the number of shares and current value of your stock portfolio. Up to fifty different portfolios can be handled on one disk. Apple Computer, Inc.

Portfolio Master 3.1* A package that will help financial investors and advisors to manage securities portfolios. Offers Investors Alarm Clock, to signal expiration of all options; Sales Records, to keep track of sales; Advisors' Report Card, to follow the performance of investment advisors; and Weigh the Information, to enter current prices against values. 48K; two DOS 3.3 disk drives. Investors Software.

POS BASIC Function. POS function returns the current horizontal cursor position. The format is:

```
<variable> = POS(<n>)
```

<n> is a dummy argument; it doesn't matter what digit is entered.

The current horizontal (column) position of the cursor is returned. The returned value will be in the range 0 to 39. PEEK(32) can be used to find the vertical (row) position of the cursor, which will be in the range 1 to 24.

Position of Carriage BASIC. You can "home" the print head (return it to the left side of the printer carriage) by entering the BASIC statement:

```
PRINT CHR$(27)"<"
```

You can set tab stops with the use of the BASIC statement:

```
PRINT CHR$(27) CHR$(<n>)
  CHR$(<m>) CHR$(0)
```

<n> and <m> are the horizontal tab stops (you may have up to sixteen). CHR$(0) indicates the end of the tab set-up.

Position the Cursor The cursor is the flashing square (or, with some programs, a different symbol such as an underline) which appears on the screen to let you know where an action (such as typing in a character, deleting, or inserting) will take place. The cursor moves to the right as you type, and backs up to the left when you press the left arrow. The left arrow does not erase the characters as you move over them; still, if you wish to keep them, you must retype them or copy them by moving the cursor with the right arrow. The line is terminated at the position to the right of the cursor when you press RETURN. See also Moving the Cursor and Edit.

Positive Logic The voltage level most positive in the computer system is the true level; the false level is the voltage level closest to zero.

Power Down To shut off power to the computer. Also, the steps a computer may take to preserve the state of the processor and to prevent damage to it or to connected peripherals when the power fails or is shut off.

Power On Turn the power switch to the ON position or otherwise supply electric current to a device.

Power Supplies and Line Regulators These products are designed to give the user a stable power supply, free from surges or spikes. The regulated power supplies usually include a line surge supressor and several outlets for your computer and peripherals. The backup power supplies are for those times when severe power outages or drops occur. These packs will at least allow you to save your data in memory, if not continue computing for a short period of time, when power loss occurs. For more details on the specifications of each unit, contact the vendor.

PRODUCT NAME	VENDOR
Applejuice Reserve Power Supply	High Technology, Inc.
Apple-Ups	Cuesta Systems, Inc.
Datasaver	Cuesta Systems, Inc.
Direct Plug Isolator, ISO-17	Electronic Specialists, Inc.
Magnum Isolator, ISO-17	Electronic Specialists, Inc.
Mayday, The Uninterruptible Power Supply	Sun Research, Inc.
Self-Reset Power Line Interrupter	Electronic Specialists, Inc.
Super Isolator	Electronic Specialists, Inc.
Sup'R Switcher	M & R Enterprises
Supressor, The	Cuesta Systems, Inc.

Power Supply The unit that converts the voltage from the electrical supply to the voltages which the computer elements use.

Power Up The steps taken by a computer processor when the power is turned on or restored after a power failure. The processor and peripherals are initialized so that program execution may be started.

Power-Fail Restart See Guardian Angel*.

PR# BASIC Statement. Specifies the peripheral slot for subsequent output from the computer. PR#1 is the most common slot for a printer, PR#3 (on Apple II+) for an 80-column card. PR#0 returns output to the screen.

Practicando Espanol con La Manzana II (Computer-Assisted Instruction in Spanish)* Four programs: three drills on verbs and one on vocabulary. The computer presents a question, and the student is given two tries to answer correctly. Failing that, the computer gives the correct response, which the student must type in. The student can ask for a hint or the correct answer. He can also stop the process or change drills whenever he wishes. These drills are very easy to use and don't require knowledge of computers. 48K. Conduit.

Precedence of Operations When more than one arithmetic operation is indicated in a formula, the order in which the operations are executed is shown in the following list:

( )
NOT
—
*,/
+,->,<,>,=<,≠,=
AND
OR

Operators on the same line in the above list have the same priority and are executed from left to right. Because parentheses have the highest priority, they may be used to alter the order of execution.

Prefix A prefix is a word which generally describes the contents of one or more file directories or subdirectories in the Apple III.

**PREFIX$** PREFIX$ is a modifiable reserved variable used by Apple III Business BASIC for using partial pathnames to access files. The variable can be set to the desired pathname. Then, when the variable is encountered in the program, the proper file will be used as input.

Prelab Studies for General, Organic, Organic and Biological Chemistry* Demonstrations, interactive exercises, animation, and simulation are the approaches taken by this package to cover important ideas, techniques, and calculations encountered in the laboratory. 48K; DOS 3.3; ROM Applesoft. John Wiley & Sons, Inc.

Pre-Processor A program or mechanical device which prepares data for further processing.

Preschool Fun* Children, ages three to six, can use the exercises in this program. Part 1 teaches color and shape discrimination. Part 2 deals with upper and lower case letters and basic directions. Features color, graphics, sound, animation, and easy-to-read letters. 48K ROM or language card; DOS 3.2/3.3. T.H.E.S.I.S.

Preschool IQ Builder* A two-part program that teaches cognitive skills to children in grades three to six. Same and Different has the child differentiating between two shapes. In Letter Builder, the child matches a letter on the keyboard to one on the monitor. Includes a Parents' Guide. Program Design Inc.

Pre-Schooler* A two-format program that helps students learn about the alphabet and letters. A list and a concentration-type game are employed. Uses hi-res letters. 48K; DOS 3.3. Shafer Software.

Prescriptive Math Drill* Covers addition and subtraction, multiplication and division. Offers many management features: maintenance of records for 100 students, printer hard copy, teacher-set percentage of correct answers necessary for advancement. Hartley Courseware, Inc.

Presentation Aid* Colorful charts, large text, and graphic pointers are a few of the attractive features this program package has to offer. Ideal for business presentations. 48K. Energy Games.

Prevent Accidental Loss of Programs or Data See Write-Protect.

Price Quoter* Inventory includes stock items and price lists. Invoices and price quotes are printed on request. Also features recall and update options. 48K. Shanali, Inc.

Primary Math Worksheet* Increase your computation skills in addition, subtraction, and multiplication. Twenty-nine levels of difficulty. 48K. The Computer Connection.

Prime Factor* Find the prime factorization of a positive integer. 32K; DOS 3.2 or DOS 3.3. Indian Head Software.

PRINT BASIC Statement. The PRINT statement displays data on the screen. The format is:

PRINT "<list of expressions>"[;]

or

?"<list of expressions>"[;]

<list of expressions> is a list of numeric and/or string expressions, separated by commas, blanks, or semicolons. You must enclose any string constants in the list in quotation marks.

PRINT statement alone will display a blank line. The question mark (?) may be used as a shorthand way of entering PRINT only when you are using BASIC.

The punctuation in the <list of expressions> determines the spacing of the printed items. BASIC divides the screen line into two zones of sixteen each, and one zone of eight. In the <list of expressions>, a comma will cause the next item to be printed starting in the first space of the next zone, with the following cautions:

Position 17 is available for tab-field printing (use of commas to define tab stops) only if nothing is printed in position 16; position 33 is available only if nothing is printed in position 24 through 32.

A semicolon (;) causes the next value to be printed immediately after the last value. Placing one or more spaces between expressions is the same as typing a semicolon between them.

If a comma, semicolon, or SPC or TAB function ends the list of expressions, the following PRINT statement begins printing on the same line, spacing accordingly. If the list of expressions ends without a comma, semicolon, or SPC or TAB function, a carriage return is performed at the end of the line, and the cursor is moved to the beginning of the next line.

If the length of the value to be printed is more than the number of character positions remaining on the current line, the computer prints as much data as fits and continues to print the remaining values on the next physical line.

Printed numbers are followed by a space. Positive numbers have a space in front of them and negative numbers have a minus sign in front of them. Single-precision numbers that can be represented with seven or fewer digits in fixed point format no less accurately than they can be represented in the floating point format, are output using fixed point or integer format. For example:

$10^{(-7)}$ is the output as .0000001

and

$10^{(-8)}$ is the output as 1E-8

BASIC inserts a carriage return/line feed after printing forty characters. This will cause two lines to be skipped when you print exactly forty characters, unless the PRINT statement ends in a semicolon (;).

PRINT—Blank Line on Printer A PRINT statement with no other specifications will print a blank line on the screen or feed the paper up one line on the printer and return the print head to the left margin.

PRINT—Move Cursor Down To move the cursor down one line on the screen, enter BASIC statement:

PRINT CHR$(10)

You may also press CTRL-J as you are typing your BASIC statement; this will cause the cursor to drop one line. This is often useful when typing REMark (q.v.) statements, as it sets them off from the rest of the program listing.

Print BASIC Program Line on Printer See PR#.

Print Check Accounting System 1* A forty-account system with limited job costing capabilities to handle all your needs, including check printing and creation of a descriptive check stub for your records. Account balances and summaries are provided, as well as detailed check registers and memo entries. Designed to interface with the manufacturer's payroll system. 32K; printer. Charles Mann & Associates.

Print Current Screen on Line Printer To print the contents of the screen to a line printer, it is necessary to have a subroutine called a screen dump. This routine may be called whenever the screen pauses. It then examines each print position on the screen and transmits whatever character is there to the line printer. See Screen Dump.

Print File Reader* Save VisiCalc* data for use with BASIC programs, using the "/PF" command ("/PD in DOS 3.2). This eliminates booting VisiCalc when further calculations are not necessary. Data Security Concepts.

Print Lines Spacing in BASIC. To get one or more spaces between fields printed by your BASIC programs, use a literal of spaces like: "   ". To get several spaces between the printed values of A$ and B$, use BASIC statement:

```
PRINT A$;"      ";B$
```

See Print Zones.

Print on Printer from BASIC See PR#.

Print Random Program The Apple III Business BASIC routine used to output data from a random access text file to a designated device, such as the console or printer.

Print Sequential Program The Apple III Business BASIC routine used to print a sequential text file to a device such as the console or a printer.

PRINT USING An Apple III Business BASIC statement which is used to format the output of numbers and strings. This statement is used with the IMAGE statement by referring to the line number which contains the image statement to be used. See IMAGE.

Print Zones To leave space on the print line between items, put an extra comma (,,) in the print listing. Enter the BASIC statement:

```
PRINT A,,B
```

This prints A in print zone 1, nothing in print zone 2, and puts B in print zone 3 (col 32).

PRINT# PRINT# is an Apple III Business BASIC command which instructs the computer to write data to one of several files which are open at the same time. Apple III Business BASIC allows up to ten files to be open at once.

PRINT# USING An Apple III Business BASIC command to use the designated output format when one of several open files is written to.

Printer—Advancing One Line To advance (space up) one line on the printer without a carriage return, enter BASIC statement:

```
PRINT CHR$(10)
```

or use the "line feed" button (LF) on the printer. Entering PRINT gives a line feed—both a space up one line (line feed) and a return to left margin (carriage return).

Printer—Blank Line A PRINT statement with no other specifications will print a blank line (that is, just feed the paper up one line and return to left margin) so you can space your print out format neatly.

Printer—Compressed Print For this small type size, enter BASIC statement:

```
PRINT CHR$(15)
```

either in a program with a line number designating the starting place for the compressed print, or directly without a line number. This gives 132 characters on the 8-inch line, or about 16 characters per inch. To turn it back off, enter:

```
PRINT CHR$(18)
```

See Type Formats—Printer for more information and examples.

Printer—Form Feed To form feed (advance to top of the page), enter BASIC statement:

```
PRINT CHR$(12)
```

Or use the "top of form" or "form feed" manual control button (FF) on the printer. You may then need to adjust the paper in the printer so it actually is at the top of a page as defined by the perforations. In a program, you may want to provide instructions to the operator and a pause (q.v.) to allow for adjustment of the paper.

Printer—Line Length To set to 80 characters per line, for example, enter BASIC statement:

```
PRINT <CTRL>I 80N
or
CHR$(9) "80N"
```

<CTRL>I means press CTRL and I, simultaneously, after typing PRINT and before typing 80N.

Printer—Normal Size Print To return to normal 10-character-per-inch print size, you must turn off all non-standard print options now turned on. See Type Formats Printer for more information and examples.

Printer—Page Length To set page length to fifty-five lines, for example, enter BASIC statement:

```
PRINT CHR$(27) "C";"55"
```

Printer—Type Formats Control with BASIC. To set the Epson MX-80 printer's print size, strike method, or number of lines per inch down the page, the non-standard type format you want must be turned on by sending control codes to the printer. See Type Formats—Printer.

Printer—6 Lines per Inch To set for this line spacing, enter BASIC statement:

```
PRINT CHR$(27)"2"
```

See Type Formats for more information and examples.

Printer—8 Lines per Inch To set for this line spacing, enter BASIC statement:

```
PRINT CHR$(27) "0"
```

This line spacing is effective if you are using condensed print. See Type Formats—Printer for more information and examples.

Printer—72/7 Lines per Inch To set for this line spacing, enter BASIC statements:

```
PRINT CHR$(27)"1"
```

This line spacing is effective when you are using condensed superscript print. See Type Formats—Printer for more information and examples.

Printer Driver A collection of programs used by Apple III SOS that allows the computer to use a printer as an output device. This driver is configured to drive a letter quality printer (such as the Qume) via a serial connection. This driver handles output speed to the printer, communications protocol, carriage return delay, line feed delay, and form feed delay.

Printer Interface Card A printer is connected to the Apple thru a cable and an interface card which is usually inserted in Slot #1 on the motherboard. The Epson printer uses a parallel (q.v.) card; some letter quality printers use a serial (q.v.) card.

Printermate* This parallel printer interface card for your Apple comes with an eight-foot cable and User's Manual. It plugs into any of the eight slots of your computer, uses an extremely low amount of power, and is completely compatible with any other peripherals that use the Apple protocol for input and output. Advanced Logic Systems.

Printer's Estimator, The* Estimate all phases of the printing process with this sophisticated program. It exceeds the exacting requirements of many of the well-known printers doing business today, and saves hours over the manual estimating procedure. 132-column compatible printer. High Technology, Inc.

Printing Package* Prints out essential natal information on an 8 ½ by 11 sheet of paper. The information includes chart wheel with house cusps given to the minute and planets placed in correct houses. Given are vertex, part of fortune, equatorial ascendant (East Point), triplicities and quadruplicities, retrogrades, and sidereal time. The planets are given in zodiac longitude, latitude, and declination. Aspect grid with angular separation and major aspects. Midpoint grid with planetary pairs is given in degrees/sign/minutes. 16K; 32K. Matrix Software.

Printographer* This utility will dump the hi-res screen onto the printer or disk. Includes two formats that can be superimposed onto the screen. Written in Machine Code. 48K; printer. Southwestern Data Systems.

PRN A designator for a printer which is used with PIP under CP/M, to ensure that output is sent to a printer rather than a disk drive or the screen. When this device name is used as part of a PIP command line, the lines of the output are numbered, and a form feed is sent to the printer on every sixtieth line.

Pro Poker* A California-style draw poker game by Jay Allen. Requires eight players to start, in any combination of real players and computer players. Pair of jacks to open, the joker is Ace or wild in a straight or flush (the only ways in which the joker may be used). The cards are displayed, using high-resolution graphics, face up if there are 0 or 1 manual players; otherwise, the cards are displayed only when it is that person's turn to make a decision. This requires great restraint on the part of other players not to look at an opponent's cards! The kibbitz option will allow you to query the computer as to the recommended play. The ante is $1, bets are in $5 increments; if there have been two complete rounds with everyone folding because nobody has enough high cards to open, the bets will then be $10. This is a great way to practice your poker. The game can go on indefinitely; a player who goes bust may buy in again for an addition $100—the amount that everyone starts with. Quality Software.

Problem Solving* An introduction to problem solving. Shows you various ways a math problem can be written and then displays the problem in words. Random problems are displayed at the end. Right On Programs.

Problem Solving in Everyday Math* A step-by-step approach to solving math problems. Covers addition, multiplication, subtraction, and division; reasoning without numbers; and estimating solutions and analysis of multiple-step problems. MCE, Inc.

Process and Other Programs* Six programs for Music Cards MC1 and MC16 owners. 1) Tempo changes a disk of songs to timing mode or paddle mode; 2) Hustle constructs a disco-compatible file of songs; 3) Envelope designs and experiments with envelopes, with loudness contour displayed in hi-res graphics real-time during playback of a melody; 4) Mlist lists entry-created songs in alphanumeric format, 5) Process makes large-scale changes in entry-created songs that include appending songs and moving parts and subroutines inside a song; and 6) Flash plays back entry-created songs with a low-resolution display. ALF Products, Inc.

Probe An electrical device which, when touching a circuit point, will allow a test meter to check the circuit's connection and power.

Procedure A part of a program which helps the program's structure, readability, or reliability. The procedure is a separate function of the program and can be incorporated into a subroutine.

Process Control See CAMAC.

Processor-Bound The speed of the processor limits the processing speed of the program.

ProDOS A disk operating system for Apple II, II+, and IIe computers. ProDOS is compatible between the Apple II and Apple III computers. Its file handling system is similar to the file handling system of SOS (Apple III's operating system). ProDOS is hierarchical. It uses the same file naming system as SOS. The data formats are the same as SOS. ProDOS is Unix-like in structure. It gives the Apple II computers an operating system capable of handling advanced applications such as networking, business graphics, and the management of large databases. ProDOS may be installed without hardware modification in any Apple II, II+, or IIe computer with 64K of memory.

Professional Client Billing Series III* A billing and reporting system, designed especially for professionals. The final bill includes only the hours of service and the expense charges. A maximum of 2,500 transactions may be handled monthly. 64K. Serendipity Systems, Inc.

Professional Disk* There are four programs on this disk: 1) Alcoholic Test; 2) Heart Attacks; 3) Interest Print (calculates and bills interest on your due accounts); and 4) Sublim (flashes messages on the screen so quickly that it will influence your subconscious). 32K; Andent.

Professional Information Manager, The* Displays video material for professional authoring. Comments on the material may be stored or recorded. VCR; color monitor with audio. Cavri Systems.

Professional Mailing System* A complete system for mailing, with search and sort routines, a database, utilities, and a forms generator. Sorting can be done on all or any of ten data fields, while searching is done by record number or three-level alphabetic search. 64K. Blue Lakes Computing.

Professional Office Management System* Designed to help small professional businesses organize work time more efficiently. It can serve as an appointment reminder and billing system. 48K. Charles Mann & Associates.

Professional Secretary Package* Case histories, client address information, work schedules, and appointment dates may be kept on file for instant retrieval. A great organizer for the professional management system. 8K; 12K. Charles Mann & Associates.

Professional Time and Billing* Produces invoices, records client and personnel charges, and prints various reports. Allows user to sort, edit, and search. Includes instruction booklet. Software Technology for Computers.

ProFile* Gain more storage with this hard disk, mass storage system for the Apple III. You can get up to five megabytes of storage. A quiet and simple unit to use for fast access to your files. Apple Computer, Inc.

Profit Plan* A semi-spreadsheet to be used with the CP/M operating system. Semi-spreadsheet means text can only be entered on the left side of the sheet, as opposed to Visicalc* and SuperCalc*. A series of number commands perform data entry, utility commands, math, and formatting. User defines table dimensions and 1000 entries may be contained in the table. Most useful for financial reports where documentation is found on the left and data is entered in rows and columns on the right. Profit Plan is a helpful combination of spreadsheet and the compiler-type of model-building programs. 16K and Z-80 card. Chang Laboratories.

Program A sequence of instructions which specify a process for manipulating data. Programs can be written in many languages; languages are level-rated according to how much additional work the processor must do before the program can be executed. BASIC is a high-level language which requires that all programs be run through a compiler or interpreter. A mid-range language is Assembly language which is closer to the binary code of the computer, but still needs some processing through an Assembler before executing. At the lowest level are programs written in binary or hexadecimal code which are directly executable by the microprocessor. Before Assembly language programs were developed, all programs were written in binary code—a tedious, time-consuming task.

Program—Load LOAD loads a BASIC program from diskette or cassette back into the Apple's memory.

For a program named "SAMPLE," if it is on the default diskette, enter:

```
LOAD SAMPLE
```

If SAMPLE is on diskette in drive #2, enter:

```
LOAD SAMPLE,D2
```

If SAMPLE is on cassette, rewind the cassette and type:

```
LOAD
```

All LOAD instructions erase any program lines you have in memory before the LOAD. If you want to combine a SAVEd program with the one you are writing, see MERGE.

To run the program, use RUN SAMPLE which will first close any files now open, then load SAMPLE into memory and run it. See also SAVE and RUN.

Program—Operator For programs you write, the operator will most often be you. But, if others will ever use your program, you should give some thought to giving clear prompts (q.v.) for every item of input data, freezing the screen (q.v.) long enough for them to read or act on the information displayed, and providing clear error messages if anything is entered incorrectly or error situations arise. This is often referred to as human engineering—making the program easy to use as well as technically correct. Another term for this side of programming is making the program user friendly.

Several other guidelines exist for writing user friendly programs. If a complex series of data items has been typed in but some entries turn out to be invalid, the user should be able to reenter only the bad items. Error messages should indicate not only that an entry is invalid, but also in just what way it is invalid and, if at all possible, some hints as to how to correct it (such as a list of possible correct values).

Program—Version or Release. Programs and software packages are changed from time to time to correct errors or add new capabilities. To keep programs from being in a constant state of flux and to simplify distributing modified programs to users, a number of changes are made, tested, and packaged as a new version or release of the program.

Versions (or releases) are typically numbered:1.0 for the first version, 1.1 for the first minor revision, 1.2 for the second minor revision, etc. When a major change or large number of minor changes have been made, a new number may be assigned, such as Version 2.0.

Apple DOS, for example, was released as DOS June 3, 1978 and as DOS 3.1 in July of the same year. In February of 1979, DOS 3.2 was released with many more changes. All these versions contained a formatting command which initializes a diskette to receive thirteen sectors. A minor revision (DOS 3.2.1) was released in July, 1979. Then in August, 1980, DOS 3.3 was released, which is the DOS format currently in use. DOS 3.3 writes a diskette with sixteen sectors. DOS 3.2 diskettes cannot run directly with the current DOS (which is now loaded using the system master diskette) but must be rewritten using the MUFFIN utility so that they are in sixteen sectors format.

Program, BASIC Run or execute a program. See RUN and LOAD.

Program, How to SAVE For a BASIC program named "SAMPLE":

On diskette (the default drive):

```
SAVE SAMPLE
```

On diskette (drive #2):

```
SAVE SAMPLE,D2
```

On cassette, first rewind the cassette, press PLAY and RECORD together, then enter:

```
SAVE
```

To run the program at a later time, use the LOAD command to copy it from the diskette (or cassette) you saved it on, back into the Apple's memory. See LOAD.

To SAVE the program as a protected file, use embedded control characters in the file name. These characters do not show on the screen, neither when you are saving the program nor when you CATALOG the disk. They must be entered in the correct sequence to LOAD. The name can be completely hidden from the catalog if you include in the file name as many CTRL-Hs (backspaces) as there are characters in the file name. While a clever programmer can get past this, it will at least prevent a casual or accidental modification of your program.

The SAVE instruction does not alter your program in memory. Be aware that, if you write a BASIC program, it will be lost (erased) unless you SAVE it before you either turn off the Apple or use the NEW command.

Program, How to Start If you know the name of the program which is stored on your diskette, you may either LOAD and then RUN the program, or RUN it directly. The format is:

```
LOAD <filename>
or
RUN <filename>
```

If you LOAD a program, you may then inspect it by typing LIST (q.v.) before RUNning it. If you type

```
RUN <file name>
```

DOS will LOAD and RUN the program with the one command. If you do not remember the exact file name, you may check the contents of the disk by typing CATALOG (q.v.).

An exception is any diskette set up in "turnkey" format. These diskettes have a file which is executed automatically by DOS when the Apple is turned on or rebooted. This file contains a command so that the program will start automatically.

Program, Object Machine language program resulting from translation of a source program (q.v.).

Program, Source A file which contains data to be processed by a language processor or interpreter. This is a matter of function rather than contents. For example, suppose you write a BASIC program called SAMPLE. When you save it to disk, the catalog will display:

```
A nn SAMPLE
```

where nn stands for the number of sectors on the diskette occupied by your program. This is a source program which will be processed by the BASIC interpreter each time it is run. Files on your diskette for which the catalog displays:

```
B nn SAMPLE1
```

are Machine language programs (the B stands for binary), which cannot be LISTed when they are BLOADed in memory. They are already in the object program (q.v.) form. See Interpreter and Program, Object.

Program, The* Teaches about computer programs in general—what a program is, program types, traits common to programming languages, etc. A specific problem is solved using a variety of languages to demonstrate how various languages operate. 32K. Micro Power & Light.

Program Controller* A utility package that provides program execution and listing control. Elements which can be controlled are speed, listing format, cursor, line printer, and memory pointer display. Howard Software Services.

Program Counter A register which holds the address in memory of the next instruction to be executed. The counter is incremented each time an instruction is executed. The counter can be modified through subroutines or calls so that the instruction that is to be executed next is different from that which directly follows in the program.

Program Diskette A diskette which is primarily used to store data processing programs. Likewise, data diskettes are used primarily (or totally) to store data rather than programs. Often a diskette will contain both data and the programs needed to process the data.

Program Generator A program that creates applications programs from non-program specifications without the need for high-level programming. See The Last One*.

Program Integrity Procedures that protect programs (or data) from being improperly altered. For example, in a payroll system, steps must be taken to insure that employees cannot improperly alter their pay rates or hours worked. Data security consists of guaranteeing both data integrity and data privacy.

Program Line Editor A program line editor is a program or utility which lets you add, delete, or change computer program lines. Some line editors are contained in the computer's ROM. Others are loaded from a program diskette. The latter are loaded into RAM in a manner that allows the program being edited to load into a memory space that's not occupied by the line editor. On the Apple this is accomplished by setting HIMEM to the Apple, this is accomplished by setting HIMEM to prevent the program you are editing from writing over the line editor.

Program Lines, How to Delete BASIC. To delete program line 100, enter:

```
DELETE 100
```

or just

```
100
```

To delete program lines 100 to 200, enter:

```
DELETE 100-200
```

To delete all program lines up to 100, enter:

```
DELETE -100
```

To delete program lines from 100 on with DELETE, you must specify the final line number. If you want to delete lines to the end of your program, either LIST to find the last line number or enter a dummy line at the largest possible line number—65529. Then enter:

```
DELETE 100-65529
```

A dummy line might be:

```
65529 END
```

Program Lines, How to Display To display all program lines, enter:

```
LIST
```

To display program lines from start up to line 100, enter:

```
LIST-100
```

To display program lines from line 100 to end, enter:

```
LIST 100-
```

To display program lines from line 100 to line 200, enter:

```
LIST 100-200
```

or

```
LIST 100,200
```

To display program line 100 only, enter:

```
LIST 100
```

To freeze the list while it is being displayed so you can read it, press CTRL-S.

Program Lines—New BASIC Programs To start a new program, type:

```
NEW
```

This completely erases all lines now in BASIC's memory. If there's something you want to keep and haven't already stored on diskette, SAVE it first. If you don't erase the program in memory before starting on another, you will usually wind up with an unusable combination of lines from your old and new programs.

Program or Data Concatenation Simply adding one item on at the end of the others to produce one longer program or data item.

Program Unload* Copy Applesoft or Integer BASIC programs from disk to cassette. Individual programs, or groups of programs, can be copied any number of times in a single operation. Powersoft, Inc.

Programmed Exercises* Strengthen your heart and lungs with series of cardiovascular exercises. Thirty minutes a day may add years to your life. 16K. Charles Mann & Associates.

Programmer* A twelve-lesson tutorial in Integer BASIC covering language commands and programming techniques. Tests are included so you can check your progress. The computer helps you review areas where you have problems. A bonus lesson teaches you a little about creating sound and graphics. Monument Computer Service.

Programmer, The* The Programmer is a CP/M program which assists you in writing programs. The Programmer requires an Apple II, Apple II+, or Apple IIe equipped with at least 64K of RAM, an 80-column card, and a CP/M card. It also requires CBASIC or MBASIC to run. The documentation clearly explains how to use the program and takes the user through the process of designing a mailing list program. The manual contains several sample programs which are explained step by step. They should be performed to gain valuable experience prior to writing your own programs. The Programmer is a powerful programming aid for the experienced and novice programmer alike. Advanced Operating Systems.

Programmer Plus* A sixteen-lesson tutorial in Applesoft II BASIC which teaches all the necessary commands, syntax, and functions to program in BASIC. Additional lessons are included on graphics and sound creation. Monument Computer Service.

Programmer's Handbook to the Apple II* Edited and compiled by Conway B. Christensen. This book first came out as a looseleaf that provided the users of the Apple II and Apple II+ with a convenient reference work for programming and using their computers. The new paperback version of this book is just as convenient, and it covers the Apple IIe (as well as its predecessors). The handbook is a collection of useful material from the *Apple II—DOS Manual, Applesoft II, Apple 6502—Assembler/Editor,Apple II—Apple Plot, Apple II—Applesoft Tool Kit, AppleWriter, Apple II—Reference Manual, DOS 3.2 Version, Pascal, VisiCalc*, Microsoft Z-80 Softcard Vols. 1 & 2,* and the *CP/M Handbook with MP/M.* It uses material from each of these manuals and references to explain how the Apple computer works, how it is programmed in various languages, and how to use a number of programs such as AppleWriter* and VisiCalc*.

Although some of the content is dated this book provides a portable reference, so the veteran programmer won't have to consult all of the above manuals. Its treatment of all material is brief but complete. It presents a discussion of the System Monitor, how to use Assembly language, covers DOS and DOS commands (both versions), the Apple 6502 Assembler/Editor, and both versions of BASIC used by Apple computers. It also covers Pascal, the Macro-Sced screen editor, the DOS Tool Kit, Applewriter I Word Processor, VisiCalc (16 sector), Microsoft CP/M, and BASIC 80 (the Microsoft version of CP/M BASIC). The final sections are devoted to Apple computer hardware descriptions, Silentype, and Paper Tiger printer commands, the use of expansion cards, and a section on the Apple IIe. Computer Stations, Inc.

Programming Aids 3.3* Twelve utility programs to help the programmer. They include The Peeker, The Patcher, The Copier, The Lister, The Cruncher, The Prompter, The Screen Printer, The Line-Cross Referencer, The Variable Cross-Reference, The Array Editor, and The Calculator. Dakin5 Corp.

Programming Help Software See Advanced Applesoft; Advanced Pascal; Anyone Can; Apple Assembly Language Training Materials; Applesoft BASIC; Applesoft Special Features; Assembler Teacher; Basic BASIC; BASIC Programming; BASIC Teacher, The; BASIC Teaching Pack; BASIC Tutor Series; Beginner's Pascal; Beginning Applesoft BASIC; Beginning BASIC; Computer Programming; Demo Disk, The; Demo Disk 2; Demo Package; Early Childhood System; Essentials Disk; Experiencing BASIC Duplicating Masters; Experiencing BASIC Task Cards; Files on the Apple; Floating Point Dictionary; Form-It-Out; FORTH Development System; FORTH II; FORTRAN Transcendental Routines; Juegos Ortograficos; Light Pen Quiz, The; Mag Files for The Disk II; Magazine Files; Magic Words; Management System in Numbers and Operations; MAT (Make A Test); Microcomputer as a Teaching Tool, The; Parent Reporting; PASS; Prescriptive Math Drill; Quiz Master—Movie Trivia & Computer Terminology; Reading Comprehension—Level D (Reading Level 4); S3E Pack Module Library; S-C Macro Assembler; Simulated Computer; Slideshow; Some Common BASIC Programs; SuperPILOT; Supersound; Systems Analyst; Systems Analyst Plus; Unlistable BASIC; Using Your Apple; VersaCalc 16; VisiCalc Boolean Logic Teacher; and ####, USING Apple PRINT.

Programming Language A set of rules specifing a language that can be translated into Machine language and can cause the computer to carry out functions.

Programming Languages See APPILOT II Edu-Disk; Apple A.L.D.S.; Apple Business BASIC; Apple FORTH 1.7; Apple FORTRAN; Apple III COBOL; Apple LOGO; Assembly Language Development System; BABBLE; BASIC Interpreter; COBOL-80; FOCAL-65; FORTH II; FORTH-79 Ver. 2; GraFORTH; Hand Holding BASIC; I Speak BASIC: A Computer Literacy Package; ICOP; Intermediate Applesoft BASIC; Introduction to Applesoft BASIC; Introduction to Computers; Linksampler; LISA Educational System; LISP: The Language; LOGO; LOGO Language; Microproducts MDS; New Step by Step, The; Pascal Disk; Pascal Learning Aids; Pascal Programmer; Pascal Tools I & II; Pascal Transcendental Routines; Pascal Tutor; Pascal Utility Micromodem Package (PUMP); Pascal Utility Package; Practicando Espanol con La Manzana II (Computer Assisted Instruction in Spanish); Programmer; Programmer Plus; Structured BASIC; Super Apple BASIC; SuperFORTH; SuperPILOT; uSPEED; Vic Documenter; XPLO; XREF/65; 79-FORTH ROM Card.

Progressed Horoscope* Produces a chart in wheel-with-aspectarian format, using angles of progression figured with NAIBOD, Quotidian, Solar Arc, or BIJA standards. Also figures converse progressions. AGS Software.

Progression Package* Makes a list of secondary progressed aspects and mutual and natal charts, with your choice of rates for progressing the angles. AGS Software.

Project Attend* A program that helps you keep attendance records. Each student's presence or absence is recorded on both a daily and an hourly basis. Handles a maximum of fifteen reports. These include Student Absence Report, Period Follow-up Report, Student Schedule Report, and Year-end Enrollment Report. Card reader and printer. Evans Newton, Inc.

Project Basic* Student's progressive status in specified districts may be monitored, tracked, and analyzed to provide teachers and school administrators with any of fifteen reports. Student History Report, School Status Report, Grade Status Report, and Objective Test Results are a few of the reports available. 48K; card reader; printer. Evans Newton, Inc.

Project Boss* A cost control system for the project manager. Input cost variables, and receive the information needed to keep costs low, or to offer a low (yet profitable) bid. A variety of reports can be generated. Monument Computer Service.

Project Control and Reporting (CORE)* Working in conjunction with Project Planning and Analysis

(PAL), this second half of the double-project package provides reports and analytical projections. The reports give performance ratings from work and project statistics. Estimations of cost expenditures, work time, personnel needs, and completion dates are provided by this managerial aid. 64K RAM; one disk; printer; and a Pascal language card. Micromatics, Inc.

Project Documentation* A time-effecient way to record minutes, daily logs, and monthly reports. Historical documents are conveniently stored for easy retreival. 48K; printer. Chriswalt Publications, Inc.

Project Management Group* A four-program package designed for industrial engineers. Analyzes and schedules activity time, calculates beginning and ending times, and more. Institute of Industrial Engineers.

Project Planning and Budgeting* A program for the the project manager. A flexible program that can be used by contractors, lawyers, accountants, engineers, and more. Helps manage your budget and keep track of costs, as well as assisting in bidding, accounting, and estimation of completion costs. 16K; disk or tape. Charles Mann & Associates.

Project Schedule Analysis I* Aids in estimating time for various jobs. Also aids in scheduling the beginning and end of individual projects and calculates the flexibility range. Cassette. Express Marketing.

PROM Programmable Read-Only Memory. A ROM which can be modified by the user.

PROM Programmer An external device or module used to write user-modified ROMs. The programmer may input data through a hex keyboard, binary paper tape, or directly through the microprocessing unit.

Prompt In general, a prompt is a visual signal from a program to prompt the operator to do something. Hopefully, the prompt gives some clue as to what the program requires (or allows) the operator to do in response to the prompt.

Prompt >,], *, ?. These are various programs' ways of letting you know which program is waiting for you to type in information.

> is the prompt for Integer BASIC.

] is the prompt for Applesoft BASIC.

* is the prompt for the monitor which uses hexadecimal code.

! is the prompt for the mini-Assembler.

) is the prompt for Apple III Business BASIC.

? is the prompt from a program written in the BASIC language, which needs you to type in data in answer to a question. It is a good idea to include a descriptive prompt (such as "Enter check amount xxxx.xx") in the program so the operator will know exactly what should be entered in response to the ? prompt. An example of how to do this follows:

```
100 INPUT "ENTER CHECK AMOUNT xxxx.xx
     ",CHECKAMOUNT
```

This gives the operator the following prompt on the screen:

```
ENTER CHECK AMOUNT xxxx.xx ?
```

Proofs & Properties* Designed for those in first-year geometry, the program deals with critical relational properties in proofs and proving. 32K. Micro Power & Light Company.

Propagate To go from one component in the computer system to another.

Propagation Delay The time the processor takes to pass a signal through one device on the system to another.

Property Management* A program that handles bookkeeping functions required in the management of income property. It is applicable to residential as well as commercial properties. Property Management offers features such as monthly posting of rental charges, transaction history of tenant charges, deposits, payments, refunds, write-offs, current balances for all accounts, audit trails for all monthly transactions, property-related expenses, depreciation, etc. Reports are formatted in an IRS-type, modifiable and expandable form. Property Management is one of the modules available on Continental's Computer Programmed Accountant System.

The package can print out tenant statements with mailing labels. Other features include: 1) tenant rent dates that may vary throughout the month, 2) flagging of overdue or terminating tenants, 3) computing and posting late charges, and 4) tracking rent increase dates and percentages. 48K; two disk drives; 132-column printer. Continental Software.

Property Management* A single-entry, general ledger program that maintains tenant transaction records for a year. A file of tenant information includes data such as name and unit address, contract limitations, deposits, and more. Generates five kinds of reports: General Ledger, General Ledger by Tenant or Account, and an Operating Statement by statement and account, featuring begining and end cash balances, and income and expense percentages. Real Estate Microcomputer Systems.

Proportional Spacing The printer allocates horizontal space according to a character's width, rather than having standard width space for all characters.

Pro-Printing Package A printing package for the professional astrologer. This program provides a natal package printed on an 8 ½ by 11 page. A large, seven-inch chart wheel that has planets spaced proportionally is part of this program. A list of planet longitude and declination, moon, lunar node, vertex, and part of fortune and equatorial ascendant (east point) is also included. Provides an aspect grid including node, ascendant, and midheaven with major aspects plus indication of applying/separating and degrees out of orb. Bookstores and professionals use this to get hard copy charts for their clients. Matrix Software.

Protected Diskette A diskette is write-protected if it does not have a write-protect notch on the right side. See Write-Protect, Diskette.

Protected Field Some data entry screens have areas that are reserved and cannot be modified by the user with keyboard entry.

Protected File If you have SAVEd your program using imbedded control characters (see Program, How to SAVE) you must enter these characters from the keyboard in their proper sequence, in order for the program to LOAD. If you use the ESC-I or up arrow to move the cursor to the line containing the program name in the catalog display and then use the right arrow to copy over the name, the program will not LOAD since the right arrow will not copy the invisible characters.

Protected Programs In an attempt to provide copyright protection for software programs, companies are using more and more sophisticated schemes to make it impossible to copy the diskette using ordinary copy programs (such as Copy A). At times, this may cause a problem with your computer, and you will be unable to use the program. Usually the problem is one of quality control where the diskette was duplicated for the publisher; you should return the diskette to the place where you purchased it and get an exchange. If this is not possible, write directly to the publisher, explaining in detail what happens when you attempt to use the program.

Protection Software See LOCK.

Protein Balancing for Feedlot Cattle* Determine the usable food energy in your feedlot rations, as well as what supplements, if neccessary, should be used. AG-COM.

Protocol The rules governing the exchange of information between two computer systems.

Pseudo-Instruction A user-defined directive which is interpreted by the Assembler as one or more instructions.

Pseudo-Operation Or, Pseudo-Op. An operation code recognized by an Assembler, but not corresponding to any Machine language instruction. Examples are ORG, which specifies where a program will reside in memory, and SKIP, which specifies a new page in the listing of the program.

PSW Program Status Word. Contains the zero flag, carry flag, and other information relevant to the processor.

Psychotherapy* A way to find out about those secret phobias, feelings, and actions. The computer asks a series of questions which are designed to give you feedback on yourself and some comparisons to the general population. Creative Computing.

p-System See UCSD p-System.

PTP A CP/M device abbreviation which is used to direct output to a Paper Tape Punch machine.

PTR A CP/M device abbreviation used to direct the computer to accept data as input from a Paper Tape Reader.

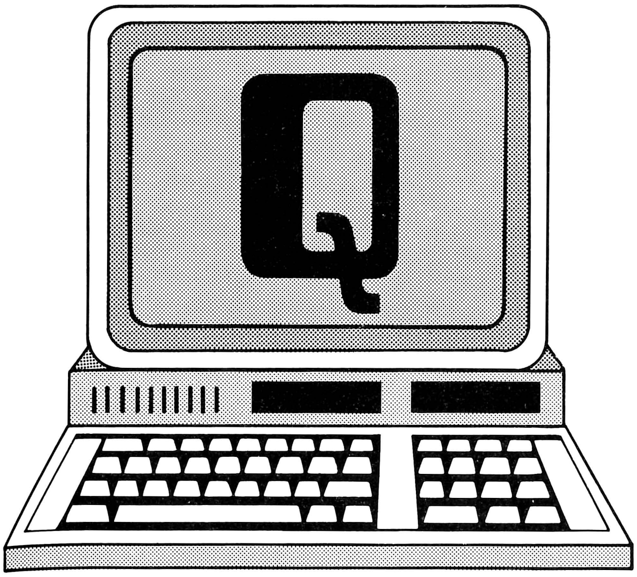
Pulser A circuit which, while undergoing testing, delivers a high current signal of short duration.

PUN A CP/M device abbreviation used to direct output to a card PUNch device, or to accept input from such a device.

Purchase Ledger System* Use this package to keep track of your purchase transactions. Handles up to 900 accounts, 4,000 postings per month, and up to 900 nominal ledger codes. It updates accounts immediately upon posting and offers comprehensive input verification. Various reports can be generated, including daybook listing, V.A.T. summary, and transaction listing. 48K; two disk drives; printer. Padmede Computer Services.

PUSH An Assembler instruction used to put a word on the top of a stack.

Pythagorean Proofs* Designed for high school level and beyond. This program presents six proofs. 32K. Micro Power & Light Company.



Q Codes. ASCII = 81, HEX 51. q—ASCII = 113, HEX = 71.

Q Half-width of power spectrum of bandpass filter response in hertz, divided into the center frequency in hertz.

Q Command Quit command in VisiCalc*. Access by entering:

/SQ<n>

where <n> is the slot of the default disk drive. Use of this command will erase all memory and boot whatever disk is in the default drive.

Q Key CTRL-Q is used to access the additional functions menu in AppleWriter* II and IIe, a widely-used word processing program for the Apple.

QA Quality Assurance.

QC Quality Control.

Q-Card* Q-Card gives you the capability of analyzing questionaires either by the use of a card-reader or by keyboard entry. Two different program disks, with a backup for each, are supplied in the package. Two data disks are required to run all the program options, although this is not made completely clear in the documentation. The error-checking routines in the program are very good, and there are screen prompts whenever you are expected to change the disk resident in the drive(s). The Main Menu is crowded, with writing on every screen line, but the titles of each choice are printed in inverse so that you can find your choice after a little experience.

All output is to the printer rather than the screen; therefore, it is necessary to have the printer connected and turned on, or else the program will not run. You can have results of raw data; frequency distribution of each response for each question with mean, median, and standard deviation; cross-tabulation for correlation between two different questions (variables); frequency distribution for any weighted or composite variables; correlations coefficients between any two variables (a table of all correlations can be reported); and a scatterplot for any two variables, with regression equations. It is also possible to merge two independent files for processing as a composite file. The program supplies two routines which give you access to the data in the Q-card files for your own specialized output. Scientific Software Associates, Ltd.

QPL Qualified Products List. Catalogs military qualified products list for high reliability applications.

Q-Pon Helper* Organize your family's collection of coupons so that on shopping day, you can choose the available bargains. This program has room for more than 300 coupons and organizes them by description, net cost, percentage of savings, quantity discounts, brand name, and expiration date. 48K. Last.

Quad Involving four entities; or a multiple of four.

Quad-Density Diskette Format Specifies storage density of a disk medium. Quad-density stores four times the amount of information per disk as single-density.

Quadratic and the Parabola, The* Includes quadratic polynomials, finding roots of quadratic equations, graphs of parabolas, definition of a parabola, equation of a parabola, tangents, and normals. 48K. Avant-Garde Creations.

Quadruple-Density See Quad-Density.

Qual* A laboratory experiment simulation in qualitative analysis (ion identification). Micropi.

Qual. Organic Analysis* A program in organic qualitative analysis that tests the students' ability to identify organic compounds. COM Press.

Questionnaire Analyzer* An excellent software package for marketing firms or marketing students. The program allows you to create a questionnaire database of up to seventy-nine questions with nine answers for each question. The statistical analysis of the answer data can be mean, in the descriptive statistics mode. Cross tab/contingency analyses include chi square, G-statistic, phi table association, Cramer V correction for phi, and more. Program will plot bar charts and histograms. Houston Instrument.

Queue A data structure which contains data or tasks waiting to be processed.

Quick File III* An information organizer for the Apple III. Whether it's for a small or large business, school, or household, you can design the files and output format. Full editing is included. Apple Computer, Inc.

Quick—Search Librarian* This program helps you create a database of about 1000 articles per disk. Each item in the database can be assigned up to twelve codes for searching and/or cross-referencing. Searching is rapid and you can use up to sixteen parameters to find the article you want. Sorting of articles can be done on up to three fields (author, title, and source), in either ascending or descending order. DOS 3.2 or 3.3; 48K. Interactive Microware, Inc.

Quieres Jugarme?* A match game in Spanish that involves substraction and logic. Grades two through four. 32K; Applesoft. NTS Software.

Quikdirt—Capital Budgeting* Make the most of your limited resources. This program analyzes the effect of decisions made with current available capital and the possible results. Different variables can be input to see the changing effects. Wyman Associates.

Quikdirt—Cash Replenishment* A program that helps plan cash flow with minimal bank contact (that could add up to high service charges). It can help the small business or household reach this goal. Wyman Associates.

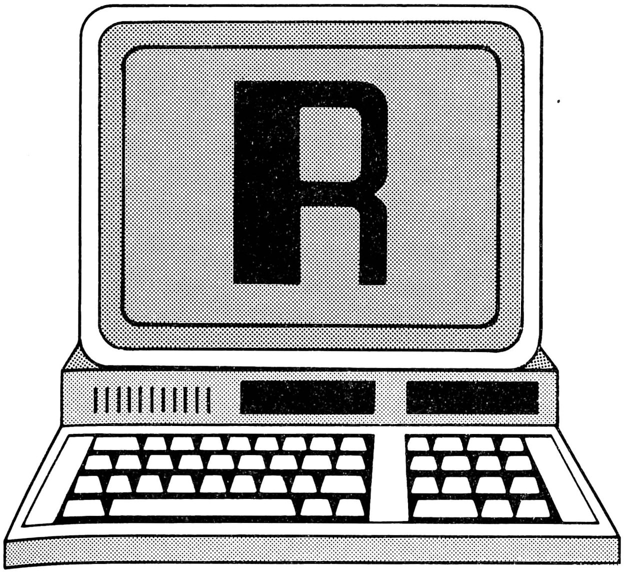
Quikdirt—Production Scheduling* Priorities and time estimates, computed by this program, aid in meeting dead lines and due dates. Wyman Associates.

Quikdirt—Transportation Planning* Aids the transportation industry in such areas as planning economic routes, keeping ahead on supply and demand, and calculating shipment costs. Allows a maximum of 3000 source-destination mixtures. Wyman Associates.

Quik-Vis* A preboot for VisiCalc* which enables you to move the cursor around a spreadsheet with a joystick rather than with the directional arrow keys and the space bar on the Apple II and Apple II+ or with the four directional arrows on the Apple IIe and Apple III. Quik-Vis must be booted before VisiCalc*. The screen display, after booting, contains the only instructions required to boot VisiCalc successfully. Once both programs have been booted, the cursor is under the control of the joystick. On a two-button joystick, the red button gives extra speed to cursor movement and the black button returns the cursor to the HOME position. The product operates well, but one feature of VisiCalc is lost when it is used. Normally, the program treats a cursor move made with an arrow key as a RETURN. When Quik-Vis is in use, RETURN must be pressed before the cursor is moved if the contents of a particular cell are to be accepted as data by the program. Kraft Systems Company.

Quiz Master—Movie Trivia & Computer Terminology* A series of subjects that are taught through multiple choice questions. Each disk contains one subject and up to 1000 questions that will give an excellent understanding of the subject of interest. Includes movie trivia and computer terminology. Lazer Systems.

Qwerty The traditional typewriter keyboard layout, in which the keys for those six letters (q-w-e-r-t-y) appear in that order in one of the rows.



R Codes. ASCII = 82, HEX = 52. r—ASCII = 114, HEX = 72.

R Reset. Also, Register, Request, Ring Indicator.

Rack Mountable Describes equipment packaged for installation in a metal cabinet called a rack.

Radiation Hardening A quality assurance process used in the production of ICs to select circuits which are better able to withstand radiation.

Radio Frequency Modulator—Hooking up to a TV The RF (Radio Frequency) modulator connects to the auxiliary video output connector on the motherboard of the Apple II/II+. The purpose of the RF modulator is to convert (or modulate) the signals generated by the color card (which are correct for a monitor) to the type required by a home TV set (Radio Frequency).

Radioactivity* A program for junior high school students that discusses fusion versus fission, alpha decay, beta decay, gamma decay, chain reactions, half-lives, nuclear reacters, and binding energy. 48K. J & S Software.

Ragged Margin Not justified. See Justify.

Rain* A chemistry game in which you are asked to stop organic compounds from falling to the bottom of the screen by supplying compounds with which they will react. As the game progresses, the falling compounds increase their speed. COM Press.

Rainbow Graphics* Joysticks are used to create artistic drawings. Dots, lines, and circles are a few of the shapes which can be produced and colored. Choose from six different fonts for documentation. 48K. Rainbow Computing.

Rainbow Writer* Graphic and sound effects are developed with this menu-driven utility. Includes six chromatic octaves. 32K. Personal Software, Inc.

RALU Register-equipped ALU (Arithmetic Logic Unit). A bit-slice ancestor (National Semiconductor).

RAM Random Access Memory. Memory is any device which can store information and allow it to be retrieved when needed. The Apple relies primarily on random access memory (RAM), read-only memory (ROM), diskettes, cassettes and hard disks. Memory, by itself, is usually a reference to RAM. This is the general purpose, erasable and reusable memory located inside the Apple.

Contrast this with external memory such as cassette, diskette, and hard disk, which involve mechanical motion to retrieve data and are thus hundreds or thousands of times slower than internal memory. Data in internal memory is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT).

If data has been created, it can be written out to external memory without a READ first. And if data read in from external memory has not been modified, there is no need to write it back out since the original copy is still there.

While external memory is very slow relative to internal memory, it also has advantages. It is much cheaper per character of data stored on-line (available for processing without manual intervention). In addition, the ability to store external memory data off-line (such as diskettes or cassettes in a box) allows essentially unlimited storage of data. This, of course, requires the manual step of inserting the diskette/cassette/disk before the data can be loaded into the internal memory for processing. See Virtual Memory; RAM Disk; Spool; Bank Switching; Memory Maps; Memory Address; Memory Segments; Bubble Memory; RAM Memory Card; Diskette Format.

RAM Disk A block of RAM memory used by a program to simulate a diskette drive. The program must modify or intercept all I/O to the "fictitious" drive and redirect it to the RAM memory. The RAM disk will have its own drive letter or number and appear in every way like a real diskette except that it is much faster.

RAM Memory Card A card containing RAM memory to expand the computer's main memory.

RAM Pack A package containing expansion RAM to mount outside to the computer. If mounted inside the computer housing, it would be called a RAM card.

RAM Test* Test your newly expanded RAM. Apple Computer, Inc.

RAMcard* Plug this board into Slot 0 of your computer and you have a low cost alternative to the Apple Language Card for extra memory. This card cannot be accessed by programs which do not utilize the Language Card. RAMcard and SoftCard (q.v.) can be used together to provide a CP/M system with 56K RAM. Microsoft Consumer Products.

RAM Disk 320K Memory System* An add-on memory system that is designed to function like two standard disk drives while giving you increased access speed. The package includes a slot-independent interface board, and a rechargeable battery that provides three hours of backup power. The system is DOS 3.3 and Apple Pascal 1.1 compatible. Axlon, Inc.

Ramex-128* This memory expansion card comes with enhancer software which adds more commands to DOS. Subsequently, you can use the 128K card as a disk emulator, thus speeding up access to your programs. Complete utilization of these additional features assumes that you have a working knowledge of ordinary DOS; you should not assume that the 128K card will perform all these expanded features without any work on your part. See Super Expander Plus. Omega MicroWare, Inc.

Ramplus +* A card that provides you with 16K RAM installed and the option of adding an additional 16K. It slides in any slot of the Apple and, when fitted in the number 0 slot, will provide Apple Language Card functions. Mountain Computer, Inc.

Random Access An access method whereby each data item can be retrieved directly by an address computed from the data.

Random Number BASIC. See RND.

Random Numbers Extending the length of the sequence. Random numbers on the Apple are only pseudo-random, as they are generated by reference to the values in two address locations. The numbers which are present at address locations 78 and 79 (decimal) are used as the seed for the Apple's random number generator. If you do nothing to alter these values, the same numbers will come up every time you boot the computer; neither DOS nor Applesoft will cause any change to the values. By using the following line, you can start the random number generator on any of 65,536 different sequences.

```
X = RND(-PEEK (78) PEEK (79)*256)
```

This line should be used near the beginning of your program. Thus the beginning number will be different every time, or almost every time, and the seed location is constantly being incremented while waiting for a key to be pressed. To alter the sequence again, you should re-seed the generator occasionally from within your program by inserting the following line, at random line numbers:

```
X = RND (-RND (1) )
```

Although this is still a pseudo-random number, the extent of the sequence is so long as to make repeats unrecognizable.

Random Walk, A* A plotter program that runs in Applesoft BASIC. Computer Stations, Inc.

RAS Row Address Strobe. A signal used in dynamic RAMs to reduce the pin count by multiplexing the address.

Raster Scan (CRT Display) A standard TV display technique whereby an image is built from aggregates of dots of varying brightness.

RATFOR RATional FORtran. A structured dialect of FORTRAN which is complied into standard FORTRAN by a preprocessor.

Rational Function Grapher* The user is allowed to enter any rational function of the prescribed form. After the values of the variables are defined, the function is graphed with the asumptotes drawn. The program's versatility becomes increasingly obvious with experimentation. 48K. Math Software.

Rayed-Wheel Printing Package* Provides wheel plus longitude, latitude, declination, triplicities, quadruplicities, etc. Available in a couple of forms. 32K. Matrix Software.

R-C Resistor-Capacitor. A circuit connected to an oscillator to define its oscillating frequency. For stable frequencies, a crystal is required.

RD Received Data (RS-232C standard).

RDE Received Data Enable. A status flag in a UART.

RDKEY Monitor Routine. The RDKEY routine takes each keypress and processes it, usually to the COUT (character out) routine.

RDOS Real-time Disk-Operating System. See DOS.

RDR A CP/M abbreviation used to describe a user-defined device which provides input to the system. This could be a tape reader, a card reader, or similar device.

RDY ReaDY. A control signal used with slow memory or devices, to indicate that valid data is available.

Reactions* Designed for junior high students, this program discusses chemical reactions both exothermic and endothermic. It also explains how to balance a chemical reaction and the factors that affect the rate of chemical reactions. 48K. J & S Software.

Read a Driver File Option The Apple III Utilities Diskette contains the System Configuration Program which is used to set up the hardware/computer connection. One of the options offered by this program is the Read a Driver File Option. This option is executed by pressing the letter R when the menu for the System Configuration program is being displayed on the screen. The first step in using this option is to read the current drivers used with the system. Any drivers which will not be used should then be deleted. Any drivers which will be used, and which are not present, should be added by using the Read Option. Once the system has been configured by ensuring that the proper drivers are in place and the system parameters are set properly, the new configuration can be saved to disk with the Generate New System Option.

READ BASIC Statement. Reads values from a DATA statement and assigns them to variables. The format is:

```
READ <variable>[<,variable>...]
```

<variable> is a numeric or string variable, or an array element, which is to receive the value read from the data table.

A READ statement must always be used in conjunction with a DATA statement. The READ statement will take values read from the data statement and assign them to READ variables on a one-to-one basis. The variable types must agree with the data being stored in them or a SYNTAX ERROR will occur.

One READ statement may access several data statements or several READ statements may access the same data statement. If the amount of data available is less than the number of variables allocated for the data, an "Out of data" error occurs. If the number of variables in the READ statements is less than the amount of data items, subsequent READ statements may be used and reading will begin at the first unread element. If there are no subsequent READ statements, the extra data is ignored. Data can be reread using the RESTORE statement. See RESTORE.

READ# The READ# command in Apple III Business BASIC is used to instruct the system to read data from one of several files which are open at the same time. Apple SOS allows as many as ten files to be open at the same time. Each file which is open under these circumstances is given a file number by using the "#" symbol and assigning a number from 1 to 10 after this symbol. This assignment is accomplished by using the OPEN# command to specify which number will be assigned to which file.

Read Character from Keyboard BASIC. See GET and INPUT.

Read Data from File BASIC. When information is contained in a file on disk, it is necessary to transfer this information to memory before it can be manipulated. With a sequential file, the necessary statements/commands might appear as follows:

```
10 D$ = CHR$(4)
20 PRINT D$; "OPEN filename"
30 PRINT D$; "READ filename"
40 INPUT A$
```

As OPEN and READ are DOS commands, they must be preceded by CHR$(4). Once the file is open and you have indicated that you wish to READ information, any INPUT (for a full string, terminated by CHR$(13)-RETURN), or GET (for one character) will take information from the disk file until you have reached the end of your file. When using a sequential file, it is a good idea to make the first item the number of records currently in the file, so that you will be able to use this information to control the number of times you INPUT data, thus avoiding an EOF (End Of File) error message.

When using a random acces file, the format is slightly different; line 20 from the above program would have to specify the length of the records (in bytes), and line 30 would have to specify which record you wished to examine, as follows:

```
20 PRINT D$; "OPEN filename, L200"
30 PRINT D$; "READ filename, R5"
40 INPUT A$, B$, C
```

This would indicate that each record was 200 bytes long, that you wished to read the fifth record in the file, and that the record contained three fields, two alpha or alphanumeric, and one numeric.

READ—Input Data into Memory Data in internal RAM is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT).

If data has been created, it can be written out to external memory without a READ first. If data read in from external memory has not been modified, there is no need to write it back out since the original copy is still there.

Reading Comprehension—Level D (Reading Level 4)* Increase your vocabulary as you develop speed in reading comprehension. You will enhance your literal understanding, interpretive, analytical, and evaluation skills. Information and scores may be kept for up to 100 students. Software Technology for Computers.

Reading Games* A series of educational games that are fun and are recommended for early elementary grades to basic adult education. All ten of the packages are sold separately and feature easy programming, deal in one specific reading comprehension skill, have good graphics, require user interaction via the keyboard, are available in two reading levels, and list cumulative scores at the end of each game. The following games are available: Getting the Main Idea gives the players a sample from each city they pass on a trip around the world; Context Clues asks the player to find a hidden treasure; Drawing Conclusions is a game similar to bingo; in Fact or Opinion players shop through the mall and must answer questions when they enter stores; Reading For Detail is a horse racing game that asks each player to answer questions about reading selections; Sequence asks players to read short stories and arrange the paragraphs in proper order; in Following Directions players must follow directions and answer questions to get from one place to another; Cause and Effect asks players questions while on a mountain climbing expedition; Inference moves the player through the educational system while giving generalizations about life at school; and Alphabetizing, which uses a large grid to place words in the proper order and comes in four levels of difficulty. 48K; DOS 3.3. Specify reading level. Learning Well.

Reading Rashi* Teaches the student Rashi script by comparing each Rashi letter with the corresponding letter of the standard Hebrew alphabet. Special features: 1) similarities and differences are pointed out through use of animation and flashing displays, 2) gives an index to whatever letters are being taught to help the teacher alleviate problem areas, and 3) gives three reviews of the material for each section. Institute for Computers in Jewish Life.

Read-Only Memory ROM. Storage which can be written only once. The Apple relies primarily on random access memory (RAM), read-only memory, diskettes, cassettes and hard disks. Memory, by itself, is usually a reference to RAM. This is the general purpose, erasable and reusable memory located inside the computer.

ROM contains fixed data, usually programs such as BASIC and the System Monitor. ROM contains the fundamental Machine language programs to run the various devices attached to the Apple such as the monitor, printer, diskettes, cassettes, etc. ROM and RAM together make up the internal or main memory of the Apple, and most other computers. See Memory for a complete discussion.

Read/Write Describes the nature of an operation, i.e., the direction of data flow.

Real Estate Analysis* A program that features: 1) Real Estate Analysis Program, 2) Generation of Amortization Schedule, and 3) Generation of Depreciation Schedule. The first section will provide an analysis of selected income property that is based on these input parameters: loan data, income, and operating expenses. The other two sections are pretty direct. All in all, this is a good program for the individual, but not for the professional. 32K. Powersoft.

Real Estate Analysis Package (REAP)* This program can provide property income analysis, after-tax calculations, simulate inflation, and display tax shelter summaries. 48K; printer. Execuware.

Real Estate Analyst* A VisiCalc* Template package (uses VisiCalc as a mother-program). The package offers the following reports: 1) Monthly Amortization Calculator, 2) Monthly Amortization, 3) Amortization/Annual Summary, 4) Mortgage Loan Analysis, 5) Comparative Depreciation Schedule, 6) Personal Financial Statement, 7) Income Property Investment Analysis/Declining Balance Depreciation, and 8) Income Property Investment Analysis/-Sum of the Year's Digits. To use this system, first load VisiCalc*, then follow the instructions. 48K; optional printer. Apple Computer, Inc.

Real Estate Analyzer* Forecast the effects of buying and selling property on real net cash flow, and determine the actual return on your investment after sale. Expense categories include taxes, maintenence, loan costs; variable factors such as the effects of inflation on rents and property values, depreciation, and length of holding period are included in the calculations as well. Data is input and displayed in table form and properties can be tracked for up to ten years. Disk or cassette. Howard Software Services.

Real Estate Models for the Eighties* A helpful tool for understanding the new kinds of mortgages that have become available with creative financing. This program is arranged as a group of VisiCalc* templates that must be loaded into the VisiCalc program. The templates include1) Detail Amortization, 2) Summary Amortization, 3) Comparative Depreciation, 4) Wraparound Mortgage, 5) Cash Flow and Equity Return Protection, 6) Tax Consequences, 7) "No Interest" Mortgage, 8) Shared Equity Appreciation, 9) Adjustable Rate Mortgage, and 10) Loan Buydown Analysis. It helps to be familiar with real estate jargon since the documentation is somewhat sparse. 48K. Commercial Software Systems, Inc.

Real Estate Office Management* Estate brokerage firms may use this package to handle accounting and various types of information. Includes general ledger, trial balances, transaction registers, and profit and loss statements. Creates estimates of future cash flow, budgets, operating statement comparisons, and includes a check writer. Reality Automation, Inc.

Real Estate Series* A collection of programs (sold separately) that feature the following capabilities: Construction Cost/Profit Analysis allows investors and builders to organize various financial data to assist them in considering potential project costs; Property Listing and Comparables creates and maintains information on real estate property listings; Property Sales Analysis allows the property seller to see the net result of the sale, including all selling costs; Home Purchase Analysis handles information that assists home buyers, sellers, investors, and real estate agents to make successful decisions about transactions; Real Estate Analysis Module features home purchase analysis, construction cost/profit, loan amortization, and tax deferred exchange; Tax Exchange Model affords realtors and investors an opportunity to see the total financial impact of a tax-deferred or partially tax-deferred property exchange; Property Management System features tenant information, easy data entry, vendor expense accounts, rent reports, and vacancy reports; Income Property Cash Flow/ Leverage aids investors and real estate brokers in buying, selling, and selecting income properties; Income Property Analysis makes a financial analysis of income producing properties; Loan Wrap Return lets the seller see the actual percentage return on a warp-type loan; Loan Sales/Purchase calculates either the present value of a loan based on the required percentage return, or will calculate the percentage return based on the price paid for the loan; Depreciation/ACRS displays straight line depreciation and accelerated recovery system figures. Disk or cassette. Realty Software.

Real Estate Templates* A series of VisiCalc* Templates assist you in the analysis of potential ventures. The programs use built-in calculations to minimize risk and maximize potential yield. Additional features help simplify comparative depreciation, amortization, and mortgage loan analysis options. The "what if?" option will help you to select the best investments. 48K. Apple Computer,

Real Number System, The* Presents rational and irrational numbers, rationalizing the denominator, surds, inequalities, absolute values, and number line graphs. 48K. Avant-Garde Creations.

Real Time Audio Spectrum Analyzer (Model AIB-232)* A device designed to accompany Apple Integer BASIC. The interface card will plug into any I/O connector, the hardware will respond to address CO90H through CO9FH, and the software ROM resides at CCOOH through CFFFH. The buffer can be located anywhere in RAM. The CALL statement will access many different functions that are selected by the value of a variable F. An adjustable gain can be set with N equal from 255 to 1. BASIC programs may be written to store and recall spectrum data, determine reverberation time in any frequency cell or LEVL cell, generate printouts, compare present data with past, and title displays and label axes. Accessories are supplied and optional accessories are available. Eventide Clockworks, Inc.

Real Time Clock* A clock board that comes with a lithium battery backup, crystal control for high accuracy, clock generated interrupts, and more. Scitronics, Inc.

Real-Soft* An integrated package of management software custom designed for agency use. Units are grouped by location, style, or twelve other categories. Mortgage tables and comparisons are included, as is a property availability report. The system is easy to learn and comes with examples. Real Estate Software.

Real-Time An action, or system capable of action, at a speed that keeps pace with the occurrence of an actual process.

Real-Time Operating System An operating system capable of real-time task management, including event scheduling, interrupt management, and real-time event counters.

Reasonableness Test Determines whether the value of a variable falls within a bracket defined as reasonable. It is used to detect and filter noisy inputs or erroneous outputs.

Reboot DOS Also known as warm boot. Press CTRL-RESET together (Apple II+ or IIe) or RESET (Apple II). This leaves the reset vector valid and will normally send control to the Applesoft interpreter. If you have an Applesoft program in memory, the program and variables are still intact. If you are using DOS, it is the resident program (rather than Applesoft) and will restart using either Integer or Applesoft (whichever you were using when you pressed reset).

If you want to start up another program you should use PR#6 on the Apple II/II+, or CTRL-Open Apple-RESET (all together) on the Apple IIe. This will erase all data in RAM and start over with the disk program which is in the default drive. (This is called a forced cold start.)

REC In Apple III Business BASIC, this command returns the current record number of a file. Record numbers are used to read or write at specific points in a file. The file's number is contained in parentheses in an arithmetic expression immediately following the REC command.

RECALL Cassette BASIC Command. This will retrieve an array which has been STOREd on tape. You may retrieve the array under a name different from the name under which it was STOREd. The "play" button must be depressed on the recorder before the RECALL signal is given by the program.

RECALL—The Arbitron Analysis Package* A six-program package for radio or TV marketers which compares, evaluates, and analyzes the listening/viewing audiences of stations. Media Service Concepts.

Receiver* You can bill your clients with monthly statements or invoices. Packing lists and back order slips may be printed upon request. Monument Computer Service.

Recipe File* The most helpful feature about this program is that it will alter a recipe so you can plan for more or less people than the number for which the recipe was originally written. It also creates a file for recipes. 48K. Homeware.

Recipe Handler II* A program that will file, sort and store over 1,000 cooking recipes. Some helpful features are the shopping list that prints out quantity and ingredient used, and the ability to expand and contract recipe amounts. 48K. Soft Touch.

Record A unit of information, either read, written or stored, such as a punched card, a disk sector, or a line of characters.

Record Manager* A record-management system that is ideal for rapid recall and fast creativity. Searches are made directly from disk and files are about 12,000 characters in length. Records have user-defined headings, can have up to twenty fields, and be up to 255 characters long. A built-in copy program is also available. 48K. Connecticut Information Systems.

Recursive Refers to a function, routine, or procedure which calls itself.

Reducing Fractions* Gives practice in fraction reduction to give the lowest common denominator. 32K. Indian Head Software.

Redundancy The use of more than one of the same item to increase reliability or performance.

Reentrant Programs or routines written in reentrant code. This code can be used by several tasks concurrently.

Reentrant Code A single segment of code and data which is not modified during execution so that it may be called by multiple programs.

Refresh The logic necessary periodically to rewrite the contents of the dynamic RAM, typically once per millisecond (ms).

Refresh Circuitry Electronic circuitry which periodically reads and rewrites the contents of dynamic memory to prevent loss of data. See Dynamic Memory.

Register One word of memory, usually implemented in fast flip-flops, directly accessible to a processor. Most CPUs include a set of internal registers which can be accessed much faster than the main memory. The Apple's 6502 has five registers, X and Y index registers, the accumulator, the stack pointer, and the processor status register.

Register Select One or more lines used to select one register out of a given number within a device. Register select pins are normally connected to the address bus.

Registrar* A program to streamline the high school registration process. Transition from a manual system is easily accomplished, and the program will generate student schedules and class rolls automatically. Two disk drives. Omnico.

Regress* A complete, multiple regression analysis package that can create data files, do hi-res scatterplots and residual plots, generate correlation matrices and regressions, and create predicted and residual scores files. Human Systems Dynamics.

Relationship Package* Creates a wheel-shaped chart displaying both Hand and Davidson-type, as well as Synestry relationships. AGS Software.

Relative Addressing A method of memory addressing in which the desired information is located by adding a displacement to a pointer. Addresses are expressed relative to some base address or pointer.

Release An edition of a software package. Programs and software packages are changed from time to time to correct errors or add new capabilities. To keep programs from being in a constant state of flux and to simplify the distribution of modified programs to users, a number of changes are made, tested, and packaged as a new version, or release, of the program. See Program—Version or Release.

RELEASE RELEASE is the command used in the Apple III Business BASIC Graphics Driver to instruct the computer to make memory reserved for graphics available to the system for general use.

Religious Software See A Christmas Story; Bar/Bat Mitzvah Training; Bible; Bible Baseball; Bible Quiz; Brachot Boxes; Chumash Compu-Flash Cards; Compu-Dikduk; Family Bible Fun; Hebrew II; Jewish I.Q. Baseball; Jewish I.Q. Baseball—Teachers' Version; Reading Rashi; Rosh Hashana; Russian Disk, The; Sukkot; Ten Commandments, The; Write Hebrew.

Reload DOS Press CTRL-Open Apple-RESET together on Apple IIe, or enter PR#6 on Apple II/II+ to reload DOS and reset the system in all applications. Note: upon resetting the system and reloading DOS, any applications program will be stopped and any current work on a BASIC program not previously saved will be lost (erased from internal memory). See Control Keys.

Relocatable The load module or object form of a program or routine which does not contain fixed addresses, or which is structured so that it can be relocated and executed anywhere in the memory.

Relocating Linking Loader* Up to fifty Machine language files (R files that were generated by the editor-Assembler in the Apple DOS tool kit) can be linked into one program at a user-specified address. You can add or deallocate an array and Amper match, combine quick-sorts with input, and more. Micro Lab.

REM Remarks or explanatory comments in a BASIC program. Examples:

```
10 REM Just a comment
20 LET X = 1: REM Just a comment
```

The colon allows multiple BASIC statement on one line.

Rem A unit of radiation.

REM BASIC Statement. REM is used to insert remarks in programs. The format is:

```
REM <remark>
```

<remark> can be any string of characters.

REM statements are nonexecutable statements but are output exactly as entered when the program is listed. However, they do take up extra memory space and slow the execution time. REM statements may be branched into by GOTO or GOSUB statements. Execution continues with the first executable statement after the REM statement.

Remarks may also be added to the end of a line by preceding the remark with a colon, i.e., :REM. The remark, if placed at the end of a statement, must be the last entry on that line.

Reminder Calendar* Runs through the year 1987 and allows you to enter weekly, monthly, or yearly reminders. The weekly reminders may be 110 characters long; the monthly and yearly reminder are limited to forty characters. In order to have the current day displayed correctly, this program must be run every day. There is no provision for printing the reminders on paper; they can be displayed only on the screen. A program that is a classic example of computer overkill. David Foard.

Remote Control* The remote control unit used for controlling devices with Thunderclock Plus (q.v.). Thunderware, Inc.

Remote Controller* A peripheral that allows you to use up to 256 BSR remote switches without having to buy the BSR command module. The device uses minimal computer power. Scitronics, Inc.

Removable Media for Recording Information Physical modes of storing information, such as programs and data files, are called media. The main medium for Apple is diskette, but cassette, hard disk, RAM, ROM, and other devices are also used. Media are often classified as:

a) removable media, such as diskettes, cassettes, and some hard disks, or

b) fixed media, most hard disks. Fixed media are not removable from the device that drives them, so there is no ability to store additional data or backup copies off-line (outside the computing system) for insertion when needed. See Memory.

REN A CP/M command which allows the user to change the name of a file. The syntax of this command is:

REN <new filename> = <old filename>

RENAME DOS Command to rename a file. The format, for a file originally named SMPLE, is:

RENAME SMPLE, SAMPLE [<,Ss>
[<,Dd>[,<Vv>]]]

<Ss>, <Dd>, and <Vv> refer to slot #, drive #, and volume #, each of which may be specified in the order given. If not specified, the default drive and the disk contained therein will be assumed.

Rename Files Command A command available to the Apple III user via the File Handling Command Menu, on the utilities diskette that comes with the system. The command allows the user to change the local name of a particular file It is executed when the user presses R on the File Handling Command Menu. The process is self-prompting after that point.

Rename Volumes Command A command available to the Apple III user via the Device Handling Command Menu. It is executed by pressing R when this menu is being displayed.

Rent Vs. Buy* If you want to know the total cost (after taxes) of owning a home verses renting a comparable unit, this is the program for you. You will need to input data regarding financing, price, maintanence and operating expenses for the unit you are contemplating purchasing vs. similar expense information for the rental you currently occupy. The program uses this data to generate a printed report or a video graphic display. It is possible to adjust individual expenses and view the effect on the total picture. Real Estate Microcomputer Systems.

Rental Manager* Automatically posts entries between a general ledger, and an accounts payable/accounts recievable system; maintains tenant, finance, and property related information; and prints reports and other documentation. Blue Lakes Computing.

Rental Manager, The* Assists with the management of rental properties. Includes such programs as fixed assests management, general ledger, tenant records, accounts payable, and automatic processing of statements and invoices. Anyone with a basic knowledge of bookkeeping can use this package. Aurora Systems, Inc.

Renumber A Machine language program on the System Master diskette which allows you to change the line numbers of the program currently in memory. The program permits you to specify the first new line number, the increment of the line numbers, and the starting and ending lines in your current program. The default values, if none are specified, are: first = 10, increment = 10, start = 0, and end = 63999. The program is loaded on the top area of memory and HIMEM (q.v.) is set below it to protect the program. The ampersand hook is reset to jump to the location of the renumbered program, whenever it is invoked. The format for use is:

& F<n>,I<m>,S<p>,E<q>

<n>, <m>, <p>, and <q> are numbers for the values of First, Increment, Start, and End. If no parameters are specified, just enter & <RETURN>, the default values are assumed. The program recognizes only the first letter of each parameter name, not the entire word (e.g., F, not First.) If you use improper numbers (e.g., use 10 for F and 5 for I, but 200 for S and your original program starts with line 300), the program will probably give you the error message LINE NUMBERS NOT IN RANGE. On the other hand, you may get a renumbering which will result in fault program logic as lines are moved out of their proper sequence. It is especially important to plan your renumbering on a hard copy if you are renumbering only a portion of your program. There is one problem with the Renumber program which comes on the System Master diskette, if the program you wish to renumber contains a line with a multiplication problem that uses (as the multiplier) one of the numbers that will be included in the new line numbers. Ordinarily, you would expect that only the line numbers would be changed, but if you load the following test program (after having run RENUMBER from the System Master diskette), then enter &F50 to start the line numbers at 50 instead of 10, and LIST the program again, you will see an unusual change:

```
10 X = RND(1)*100
20 X = INT(X*100)/100
30 REM THESE
40 REM REM STATEMENTS
50 REM ARE JUST
60 REM TO HOLD
70 REM SPACES SO
80 REM THAT YOU
```

```
    90 REM HAVE LINES
    100 REM THROUGH #100
```

You can readily see that such a bug would cause irreparable damage to your programs, and there seems to be no way of telling what the new number will be! However, if you do the following, you will have fixed the bug and will have a RENUMBER program that works. Enter the following information from the keyboard (as shown, <RETURN> means to press the <RETURN> key):

```
    LOAD RENUMBER<RETURN>
    POKE 4789, 172<RETURN>
    POKE 4790, 171<RETURN>
    SAVE RENUMBER<RETURN>
```

If you are leery about saving your new program under the same name as the old (which will write over the old program), save it under a new name such as Renumber/Fixed.

Repeat Factor Apple III Business BASIC has a number of formatting utilities which are used to define the output format used on the screen, with files and by printers. Numbers and strings can be formatted by "spec" expressions in program lines. Repeat factors are used in these specs to save space. The formatting expression for a string which is to be right justified must include the letter R. If the result is to be a 5 character right justified string, there are two options available to express this format. The first is to enter RRRRR. The second is to enter 5R. The 5 in this expression is a repeat factor.

Repeat Program Lines BASIC. See FOR.

Report Editor* Alter the text of Astro-Scope or Sex-O-Scope to your own tastes. AGS Software.

Reproduction—Process* For children in the upper elementery grades, this software covers the reproductive process from conception to birth. 32K. Micro Power & Light.

Reproduction Organs* The male and female reproductive systems are explained for elementary students. 32K. Micro Power & Light.

Reprogrammable Data Base Program* Novices can reprogram the system to correspond to their own needs. Includes an open source code program on Apple 3.3 DOS, a 30,000 word manual, working examples for a mailing list program, a small business inventory program, and a checking account management system. Also features a data configuration program, a file creation and management element, a sorting utility, a report formatting utility, a query and search element, and a file transfer utility. Charles Mann & Associates.

Request* Includes three different programs: Database Maintenance, Database Selection, and Database Reporting. DM features automatic index creation, automatic maintenance capabilities, error handling, automatic disk compression, and uses advanced screen formatting and data entry. DS provides search, query storage, query-generated input for automatic database management, and arithmetic search arguments. DR offers automatic headlines, optional counter, automatic grand totals, automatic statistics, and report fields that can be calculated. 48K. United Software of America.

Reserved Variables Apple III Business BASIC uses a number of reserved variables (modifiable reserved variables) available to the user. The reserved variables in this language are HPOS, VPOS, INDENT, OUTREC, and PREFIX$. These variables are assigned values in program lines which precede the line in which they are used.

Reserved Word or Name A specific value which serves a special purpose and therefore, may not be used for other purposes. In BASIC, for example, FOR is a reserved word; you may not use it as a variable name or even as a part of a variable name such as FORCE. See Reserved Words—BASIC.

Reserved Words BASIC. Reserved words have particular meanings in BASIC and are used for commands, statements, functions, and operator names. These words cannot be used as variable names and variable names cannot be (or contain) a reserved word followed by a type declaration character ($, %, &).

When used, reserved words are to be delimited (separated with a space or spaces around them), so that they are easily recognized by BASIC. If you accidentally use one of the reserved words, you may see an error message or have strange results when you execute the program. See also Debugging Programs.

Following are the reserved words in BASIC:

&
ABS
AND
ASC
AT
ATN
BLOAD
BSAVE
CHAIN
CALL
CHR$
CLEAR
COLOR=
CONT
COS
DATA
DEF
DEL
DELETE
DIM
DRAW
END
EXP
FRE
FNxxx
FOR
GOTO
GET
GOSUB
HCOLOR=
HGR
HGR2
HIMEM:
HLIN
HOME
HPLOT
HTAB
HPOS
IF

IN#	INPUT	INVERSE
INT	LET	LEFT$
LEN	LIST	LOAD
LOMEM:	LOG	MID$
NEXT	NORMAL	MOD (Integer only)
NOTRACE	NEW	NOT
OFF	ON	OPEN
ONERR	OR	PEEK
POS	PDL	PLOT
POP	POKE	PRINT
PR#	READ	RECALL
REM	RIGHT$	RND
ROT	RUN	RETURN
RESTORE	RESUME	SAVE
SCRN(	SHLOAD	SPEED=
SCALE=	SGN	SIN
SPC(	SQR	STEP
STOP	STR$	STORE
TAB(	TAN	TEXT
THEN	TRACE	TO
USR	VAL	VLIN
VPOS	VTAB	WAIT
XPLOT	XDRAW	

Reset To return to zero, or to some arbitrarily selected beginning point. Turning on the Apple or pressing CTRL-Open-Apple-RESET (Apple IIe) will perform a complete reset. Using RESET or CTRL-RESET will stop the current program completely (see CTRL-C), but leaves the reset vector and program variables intact.

Reset Console The screen control code ASCII 0 is used to reset the console options in the Apple III's Console Driver to their default values.

Reset Viewport Code The screen control character ASCII 01 is used to reset the viewport to the same size as the current screen in the control mode used by the Console Driver of the Apple III computer.

Reside Be recorded in. A program may reside on a diskette, or in memory (RAM or ROM).

Resident Software A program which resides in the main memory of the system.

Resources for Job Hunting* Tells you where to find job resources and how to use those resources to find the job you want! MCE, Inc.

RESTORE BASIC Statement. RESTORE lets you reread DATA statements from the first data item. The format is:

RESTORE

Following the execution of the RESTORE statement, the next READ statement reads the first item in the first DATA statement in the program.

Restaurant Profit Analysis* A package that analyzes menu item/ingredient profit package to calculate profit margins and cost effectiveness. You can also use it as a real-time cash register. Produces inventory reports and worksheets, year-to-date sales, amounts sold, percentages of total sales, profit/sales, and daily ticket sales. Computer Systems Design.

RESUME BASIC statement. Continues program execution after an error recovery procedure has been performed. The format is:

RESUME

The program will continue at the statement in which the error occurred.

Retail Accounts Receivable* A menu-driven program that can input new information on customers and accounts, print various balance sheets and summaries, review customer and account information, and enter over 1500 transactions per month. 3.2 or 3.3 DOS. Computer House Div./FLC, Inc.

Retail Management System* A program that assists with pricing, purchasing, and crediting for programs for small stores. Easy to use analysis, a return on investment test, and a pricing element allow the retailer to verify exact financial information. 16K. Charles Mann & Associates.

Retail Manager* Keep track of inventory, invoices, transactions, sales information, sales tax data, and more with this retail business management system. It supports ABT BarWand, other coded price tag data, and allows barcode printing. Printer with graphics capabilities; 48K; Paper Tiger IDS 440; 460G. Advanced Business Technology, Inc.

Retired Lives Reserve* The small or large business can benifit by this program, which' deals with employee health and life insurance benifits. Use the package to compare the different liabilities, costs, etc., of current employees and those that have retired. Re/International Systems Corporation.

Retirement Planner, The* Assess your income and assets for planning your retirement. It is never to early to set goals and plan ways to live comfortably in our golden years. This program gives many helpful suggestions and compares long term investment dividends, under a range of variables. ABT Microcomputer Software.

Retrofit To improve or change software or hardware by making additions.

RETURN ASCII 13 Hex 0D. The key which indicates that keyboard input is complete. The RETURN key must be depressed by the user if the program asks for information by the use of the INPUT statement.

RETURN BASIC Statement. A statement that will bring you back from a subroutine. It is used in conjunction with the GOSUB statement. See GOSUB and RETURN. The format is:

```
RETURN
```

Reverse Video The ability of some CRT terminals to display dark characters on a light background, as opposed to the standard light on dark. Also called inverse video.

RF Modulator A device which changes a composite video signal, required for most monitors, into a radio frequency signal for display on a standard television set. See Sup'R Mod* and Radio Frequency Modulator.

RFI Radio Frequency Interference.

RFP Request For Proposals.

RFQ Request For Quotes.

Rhythm Drills* Graded programs for rhythmic dictation in a melodic context. 48K. Micro Music, Inc.

Rhythmic Dictator* Instructs students to hear rhythmic patterns and to note these patterns on a one-line staff. This program will then sequence through rhythmic phrases which increase stress syncopation and rest values. 48K; Micro Music, Inc.

RI Right In. The right input to a shifter. This is the pin-in for the incoming bit to fill the vacancy left by shifting all other bits in the word to the right.

Riemann Integral, The* For high school, college, and industry use. Deals with the definite integral—finding the area under a curve. 32K. Micro Power & Light Company.

Right Arrow (→) Key Usage. Pressing the right arrow will move the cursor right one character. It will also copy over any character which is currently displayed on the screen. See Moving the Cursor for a more detailed discussion.

Right Justify See Justify.

Right Justify String Use the following PRINT statement:

```
PRINT TAB(X -LEN (A$)) A$
```

where X is the desired position of the right end of the string A$.

Right One Space Move Cursor from BASIC Program. Enter BASIC statement:

```
PRINT CHR$(21)
```

This moves the cursor and copies over any data on the screen. It is equivalent to pressing the right arrow key in the immediate mode.

**RIGHT$** BASIC Function. Returns the rightmost (n) characters of a string <x$>. The format is:

```
<v$> = RIGHT$(x$,n)
```

<x$> may be any string expression.

<n> is an integer expression specifying the number of characters to appear in the result.

If <n> is greater than or equal to LEN<x$>, then x$ is returned. If <n> is zero, the null string (length zero) is returned.

See MID$ and LEFT$.

Ring Indicator In telephone-based applications, such as telecommunications via modem, Ring Indicator is the signal on line which causes the bell to ring.

Ripple-Carry An addition technique where the carry coming out of an adder is propagated to the next adder. A faster method is to use carry look-ahead.

Rise Time The time required to complete the low-to-high transition of a pulse.

RKINET—Reaction Kinetics* A chemistry program offering exercises in mathematical modeling for experiment simulation of characteristics of chemical reaction systems. 48K; DOS 3.2 or DOS 3.3. Conduit.

RND BASIC Function. Returns a random number between 0 and 1. The format is:

```
<v> = RND(<x>)
```

<x> is a dummy variable; any number except 0 may be used.

The same sequence of random numbers is generated each time the program is run, unless the random number generator is reseeded. You can do this reseeding by using the following statement after any INPUT or GET of your program:

```
X = RND (PEEK(78) + PEEK(79)*256 : X = RND (-X)
```

Memory locations 78 and 79 are changed with each key entry, so any INPUT or GET will change the value stored in 78 and 79.

The formula to generate random numbers in the range zero through n is:

```
INT (RND (1) * (n+1))
```

RO Right Out. The Right Output from a shifter.

Roadsearch* A computerized road atlas. In addition to helping you keep track of mileage, gas consumption and so forth, the program will help you design driving routes that are best suited for your particular needs. For example, the most popular route is one that usually is the shortest distance between two cities and avoids toll roads! But you can use Roadsearch to find a route that may be longer but better. The database includes 406 cities and 69,000 miles of roads. The printout includes travel times, distances, and driving routes. Columbia Software.

Robot War* Up to five robots battle it out to see who is the most technologically advanced. The brains of the robots are programmed by humans and contained in accumulator, twenty-six memory registers, input/output registers, and a pair of index registers. They will shoot their way to victory. Muse Software.

Rocket Pilot* Simulates landing a rocket. The user is the pilot and can control vertical and horizontal thrust using two paddles. Once every second the simulation supplies figures for vertical and horizontal speed, vertical and horizontal position in relation to the landing sight, and seconds and distance until landing. Sound effects may be selected and lo-res onscreen graphics are included. 16K. Criterion Systems Games.

Rocky's Boots* A game that has young children building animated logic machines to score points. Features color graphics that helps children learn about computer circuits. The Learning Company.

Roger's Easel* A three-program package which allows the linking together of a maximum of forty-one drawings. The figures may be designed, recalled, stored, or erased. Southwestern Data System.

ROL ROtate Left. A Machine language instruction available as part of the instruction set of the 6502 microprocessor chip. This instruction makes the computer rotate the contents of a specified memory location or the contents of the accumulator one bit to the left. It is used to carry out multiplication operations.

Rollover Depressing two or more keys on a keyboard simultaneously. A good keyboard controller will include debouncing and multiple-key rollover protection.

ROM Read-Only Memory. Memory is any device which can store information and allow it to be retrieved when needed. ROM contains fixed data, including the Applesoft editor and interpreter, the Monitor (the particular version of the monitor depends upon which computer you are using), 80-column display, and self-test routines. See Virtual Memory, RAM Disk, Spooling, Bank Switching, Memory Maps, Bubble Memory, RAM Memory Cards, and Diskette Format.

ROM Boards See EPROM Board.

ROMPLUS+* Turn your Apple computer into a very powerful system with this peripheral board. Some of its many useful features include six sockets to allow individually addressable 2K ROMs or EPROMs, keyboard filter, upper and lower case letters, mulitple user-defined character sets, improved cursor control, and scratch-pad RAM. Two editors allow you to define your own characters or keyboard macros. Demonstration programs are provided on disk. Mountain Computer Inc.

ROMwriter* A device that programs 2716 EPROMs-5V, 2K. It features zero insertion force (ZIF) socket, on-board Bat Handle switch, on-board DIP switch, and installation in any peripheral slot. Offers screen-oriented editing and other programs. Mountain Computer Inc.

ROR ROtate Right. A Machine language routine available in ROM for the Apple II, Apple II+, and Apple IIe computers in its 6502 instruction set. When the computer encounters this instruction, it rotates the data in a memory location or in the accumulator one bit to the right. This particular instruction is used to carry out multiplication operations.

Root Directory The directory on an Apple III SOS boot diskette which contains all of the configuration and operating system data.

Rosh Hashana* A visual and audio teaching device for those interested in learning the laws and customs of this Jewish holiday. Prayers, phrases, and facts are explained in detail before a comprehensive test is given. 48K. Institute for Computers in Jewish Life.

ROT= BASIC Statement. Sets the angular rotation for a shape to be drawn by DRAW or XDRAW. ROT = 16 is equivalent to a 90-degree rotation to the right. To rotate in a complete circle and return to the original position, enter:

```
ROT = 64
```

ROTATE An instruction which shifts the contents of a register or word to the left or right. The bit coming in one end of the rotating word is generally the one falling off the other end; sometimes it is the old value of the carry bit (9-bit rotation).

Rounding The operation of the Applesoft interpreter rounds numbers in a curious way, with some values not being what you would expect from the usual rules. If you attempt to use a number with more than thirty-eight digits, you will get an ?OVERFLOW ERROR message, even if the value of the number is within the 1E+-38 range. To round off to a specified number of digits following the decimal, use the following algorithm:

N = (INT(N * 10—X + .5))/(10—X)

The X stands for the number of digits you desire following the decimal. The addition of .5 will round up the last digit remaining, if the last digit dropped is greater than 5. See Number Format.

Round-Robin A scheduling technique in which a task list is cycled through from top to bottom, and back again. In round-robin scheduling, each process (or device corresponding to a task) is guaranteed periodic service whatever the actual task traffic may be.

Routeplanner* A very helpful program for planning van pools, sales and business trips, delivery routes, and transit routes. Its trip planning system will help you save time, money and gas. Figures out the shortest route between any two points; you can use as many as twenty-one stops and schedule their order, if you wish. Routeplanner also figures out the distance of your travels before you start on a trip. With the database, you can save as many as 400 locations. Columbia Software.

Routine A section of code written to perform an action, such as an input character routine or a disk write routine.

Routine Machine, The* A disk, containing a number of very useful Machine language subroutines, that probably should be a part of every serious Applesoft programmer's library. Like others from the same company, this disk is written with a modified DOS and has a built-in counter in its copy program, limiting the user to a total of three backup copies. After this, the copy program will only work for standard DOS diskettes.

The routines include Swap, which performs a sort without the accumulation of string garbage; Restore Ampersand to set the vector to its original value; Shape Gobbler and Shape Table Viewer for graphics programming; Turtle Graphics, providing a set of hi-res drawings; and much more. Choose the routines you need from Routine Machine's library, and they will be put into your program. No knowledge of Machine language programming is necessary. Incorporate hi-res graphics, sound, search, sort, PRINT...Using, and additional features into your BASIC programs. Southwestern Data Systems.

Row Scanning A technique used in decoding which key of a keyboard was pressed. Each row is scanned in turn, then the output on the columns is examined, resulting in identification of the key.

RPG Report Program Generator. A business-oriented programming language which uses a highly structured system of preformatted commands.

RPM Rotations Per Minute

RPN Reverse Polish Notation. See Postfix Notation.

RPROM Reprogrammable Read-Only Memory. See PROM and EPROM.

RS Register Select. A control signal determining which of several eligible registers will be used in an MPU operation.

R-S Flip-Flop A flip-flop using two cross-coupled NAND gates.

RS-232C A widely-used standard for connecting computer system components, especially for serial communication of control characters and data between computers and serial input/output peripheral devices. Standard for connecting data terminal equipment, such as modems or network data concentrators. It allows substantial variation as to what signals are passed. See EIA-RS-232C.

RS-232C DB25 Pin Reconfiguration Adaptor, The* This small device will allow you to connect almost any serial device to any computer by rerouting the RS-232C signals. This can eliminate the tedious task of making special cables to interface different units. Mountain Computer, Inc.

RS-232C Serial Interface Port The Apple III computer is equipped with an RS-232C serial interface port which is located on the back panel of the computer. The computer may be connected directly to a modem via this port. It also can be connected to a serial interface printer via this port, provided that a modem eliminator is connected between the port and the printer. Within the computer, the circuitry that allows the microprocessor chip to communicate with a printer, modem, or other device via this port, is called the Asynchronous Communications Interface Adapter, or ACIA. The port provides a standard 25-pin connector socket for use in making the cable connection with a serial device.

RTOS Real-Time Operating System. An operating system in which data input and computer response proceed at the same rate.

RTS Ready To Send (RS-232C standard signal).

RTS Request To Send. This is a signal passed from one device to another when both devices are connected serially. The signal is passed as true when the receiving device's input buffer has space to receive data. It is false when the buffer is full.

RUN BASIC Command. The RUN command causes a program to begin execution. The formats are:

```
RUN
or
RUN <line number>
```

<line number> is the line number of the program currently in memory, where you wish execution to begin. The default (no line number specified) begins the execution with the first line number.

RUN The DOS RUN command causes a program to be loaded and executed, with the one command. The format is:

```
RUN <filename>
```

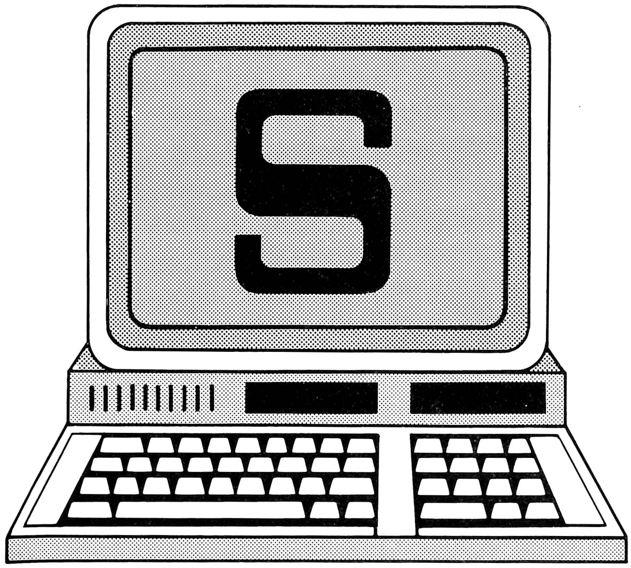
RUN <filename> loads a file from diskette into memory and runs it. It closes all open files and erases any contents from memory before loading the designated program. See INPUT and OUTPUT.

Russian Disk, The* Learn Russian on your Apple computer. Two sets of programs are included. The first teaches the Russian alphabet by introducing letters that are similar to the English counterparts and then, slowly, presenting the more unique ones. The second program develops the user's reading ability and Russian vocabulary. You can also practice typing in Russian. For ages ten to adult. 32K RAM. Instant Software.

R/W Read/Write.

RWTS Read or Write a Track and Sector. This is a Machine language subroutine which is a part of DOS. It allows the user to write information to, or read information from, any track and sector on the disk.

RZ Return to Zero. A recording technique often used on continuous magnetic media, especially tape.



S Codes. ASCII = 83, HEX = 53. s—ASCII = 115, HEX = 73.

S Select. Also: Strobe.

S S is a special parameter used with PIP in CP/M. This parameter is set when the user wishes PIP to begin copying from a device or file when a predetermined string is encountered. The start string is entered after the S parameter. The string is ended with a CTRL-Z.

S—Command Cursor The Apple III Console Drive provides the user with a number of single keystroke commands which assist in editing. These commands are called cursor commands and are accessed by pressing ESCape prior to using the command. The S command clears the viewport and moves the cursor to its upper left corner.

Sales Invoicing* Includes six items to aid in preparing reports and invoices for customers. Some features are a credit check for each customer, inventory update, detailed report on each transaction, sales and stock reports, and much more! Peachtree Software, Inc.

Sales Ledger System* Maintain your sales ledger with this system that can handle up to 900 accounts and 4,500 transactions per month. Accounts are updated as transactions are posted, input verification is provided, and rapid screen access is available. This program generates a variety of reports, including daybook listing, ledger summaries, transaction listings, and more. 48K; two disk drives and printer. Padmede Computer Services.

Sales Order Entry III* If you work in sales or order supplies, this program, along with your Apple III, will be of considerable assistance. There are a number of variables to hold information about your supplies and the status of those items at any given time. Organize the amount of supplies ordered, shipments, payments, time schedules, and calculate the amount of payment. Plain And Simple Software.

S.A.M. (Software Automatic Mouth)* A software driven speech synthesizer, which produces a more human sound than most of the robot-type monotone synthesizers. The program can be interfaced with games and educational programs. Don't Ask Computer Software.

Sample and Hold An analog circuit to capture and retain a signal so that it may be converted by an A/D converter.

Sampling Measuring an input value at intervals.

Sanyo Monitors* The following are arranged in order of price:

9 inch B/W model UM 4509. Compact, good display, size is a deterrent to use for 80-column display.

12 inch B/W model DM5012CX. Good display, fine 80-column display.

12 inch green model DM5112C4. Same as above, but green phosphor. Sanyo.

Sargon II* Winner of the European Microchess Championship. There are seven levels of play. Sargon II shows the level of play and the move it is considering. It can also offer help to the player by showing possible good moves. Cassette or disk. Hayden Book Company.

SAT English 1* A review and training course for high school students who are preparing to take the college entrance exam. Five levels of verbal comprehension include analogies, antonyms, completions, comprehension, and English grammar. 48K. Micro Lab.

Satellite Processor A computer subordinate to another computer, possibly communicating over large distances, which performs specialized processing related to the master computer. The satellite may also be contained in the same device as the main processor, creating a multi-processor machine.

Satellite Tracking Software* A flexible, advanced set of programs that can help you to find the geographical location of a satellite, update the satellite's orbital parameters based on visual or radio observation, and find its location in space in relation to its location anywhere on earth. Recommended for amateur radio operators, astronomers, and satellite enthusiasts. Sat. Trac International.

Saturn Systems 128K RAM Board* A 128K RAM Expansion Board for the Apple II, Apple II+, and Apple IIe computers. Three disks of utility software are supplied with the RAM expansion card. The first of these disks include MOVEDOS, RAMEXPAND, and DOS PSEUDODISK programs. The second of these disks contains Pascal PSEUDODISK. The third disk contains CP/M PSEUDODISK.

Installation is simple. Just take the top off of your computer case and plug the Saturn Systems 128K RAM expansion card into any available slot. The software which accompanies the card seeks slot O, but it can be configured for any other slot. This RAM expansion card can be used in combination with a variety of other memory expansion cards such as the Apple Language Card.

MOVEDOS relocates DOS 3.2 or DOS 3.3 into the second 16K bank of memory space on the RAM expansion card. This process gives the user about 10K more memory in the computer's RAM. The program also allows the user to locate Integer BASIC or Applesoft BASIC into the first 16K memory bank of the RAM expansion card. If FID, Muffin, or BOOT13 will be run in this memory configuration, they must be modified by using the MOD program included on the same disk as MOVEDOS.

RAMEXPAND is a collection of programs which allow the user to configure his system to use all of the memory capacity available with the Saturn 128K RAM expansion card and any other memory expansion cards which may be installed in his computer. This program locates itself partially into the memory expansion card and partially into the computer's main memory.

PSEUDODISK allows the Saturn 128K RAM expansion card to emulate a disk drive. When this feature is installed, either the normal version of DOS or the relocated version of DOS can use it. The PSEUDODISK software packages for DOS, CP/M, and Pascal make the expanded memory capability of the Saturn hardware available with these operating systems. This particular feature of the Saturn memory expansion system speeds up file-handling routines for programs which are transferred to the 128K memory expansion space from a disk. Saturn Systems, Inc.

Saturn Systems 192K Extended 80-Column Card (Apple IIe)* Saturn Systems, Inc. under its new name of Titan Technologies, Inc., manufactures a variety of memory expansion cards for the Apple II, Apple II+, and Apple IIe computers. This firm manufactures and sells extended 80-column cards for the Apple IIe with 64K, 128K, and 192K of expanded RAM. Each of these expansion cards comes with a User's Manual, VC Expand 80 (IIe), and the same utility disks that accompany the 128K memory expansion card for the Apple II and Apple II+ computers. The utility disks include the Pascal PSEUDODISK, the CP/M PSEUDODISK, and the DOS PSEUDODISK. Each of these disks allows the user to emulate a disk drive with the memory expansion card in either of these operating systems. The purpose of disk emulation is to download files and programs with a normal floppy disk drive to the memory expansion card and then to interact with the expansion card instead of the disk drive for all program and file access. This particular process greatly speeds file handling. The extended 80-column capability of this card is accessed in the same fashion as the Apple 80-column card is accessed. If the card is installed in Slot 3, PR#3 will turn the card on. ESCape CTRL-Q turns the 80-column display off. ESCape-4 toggles from 80 columns to 40 columns when the card is on. ESCape-8 toggles back to the 80-column mode from the 40-column mode when the card is still on. VisiCalc* can access up to 216K of total memory and can use an 80-column display by prebooting VC-Expand 80 (IIe) prior to loading VisiCalc. For further discussion of the expanded memory capabilities of this product, see Saturn Systems 128K RAM Board. Titan Technologies, Inc.

SAVE a BASIC Program To save a BASIC program on the diskette in the default drive (the one most recently accessed), enter:

```
SAVE SAMPLE
```

On the diskette in drive #2, enter:

```
SAVE SAMPLE,D2
```

On cassette, first rewind the cassette, press PLAY and RECORD together, then enter:

```
SAVE
```

To RUN the program at a later time, use the LOAD (q.v.) command to copy it from the diskette/cassette you saved it on back into the Apple's memory.

The SAVE instruction does not alter your program in memory. Be aware that if you write a BASIC program, it will be lost (erased) unless you SAVE it before you either turn off the Apple or use the NEW command.

You may save several versions of the same program on the same disk by using slightly different names, e.g. SAMPLE1, SAMPLE2, SAMPLE3, etc. Be aware that if you save a program to disk under a name (e.g., SAMPLE), and later save another program, either modified from the original or entirely different, under the same name, the first program will be written over on the diskette and cannot be recovered.

Saybrook* Insert this board in a peripheral slot and have the power of a 32-bit microprocessor on your Apple computer. This processor is based on the Motorola 68000 which allows information to be processed with lightning speed. Also included on the board is 128K of RAM which can be expanded to 256K and a 24-hour clock. Analytical Engines, Inc.

SBC Single Board Computer. A name applied to a line of board-level products built to Intel specifications and using a common system bus known as the multibus. This bus is standardized as the IEEE 796. National Semiconductor has a compatible board line designated by the letters BLC (Board-Level-Computer).

SBCS Accounts Payable* A menu-driven system that can be integrated with SBCS General Ledger*. Among its features are: credit and debit memos; vendor codes; definable aging periods; and a variety of reports. 48K; two disk drives; and 80-column printer. Small Business Computer Systems.

S-C Assembler II Version 4.0* A utility, written in Machine language, widely used by beginners. It makes coding in Assembly language as close to BASIC programming as possible (LOAD and SAVE are identical to BASIC). Highly recommended for the BASIC programmer who wants to learn Assembly language. 24K. S-C Software.

S-C Macro Assembler* Edit, assemble and test programs. Stores source files with its own high-speed technique or can read and write standard test files. Twenty Assembler directives have necessary features for development, and with twenty-nine commands, modification and editing of any program is simplified. Phoenix Software, Inc.

Scatter—Particles Scattering* Three programs that give students practice in size, shape, and force law of a single scattering center deduced from the scattering pattern it produces. Teaches students about objects from the way they scatter particles. Conduit.

SCCS Southern California Computer Society.

Scheduling Allocating a non-sharable resource such as CPU time or an I/O device to a particular task for a period of time.

Scheduling Package* Instead of using an outside agency, schools can use their microcomputers to compile and print sophisticated schedules and reports. The program is menu-driven and easy to use, and generates reports on course catalogues, registration lists, homeroom lists, course conflict matrix, individual student schedules, and more. Applied Educational Systems.

School Administration Software See Activity Accountant; Administrative Software; A.E.N. Grading System; Apple Gradebook; Assignment Set; Assistant Principal; Attendance Recorder; Attendance Reporting System; Bursar; CAI-Manager; Class Scheduling System, The; Competency Manager; Compu-Grade: Teacher's Gradebook Programs; Course History System; Course Outline; Create A Lesson; Curriculum Management System; Curriculum Manager, The; Field Trip List; Gradebook; Grader, The; Grading System Program; Gradisk; Honor Roll Sort; Orderit; Overdue Books Program; Period Attendance System; Project Attend; Project Basic; Registrar; Scheduling Package; School Manager; Schoolhouse I; Score: The Academic Assistant; Special Education System; Teachers Create Series; Teacher's Aide I; Teacher's Pet; Teaching Machine, The; Test Writer; Tutorial Quiz Master; Unicom Educational Management Services; and Z.E.S.

School Mailer* Used to print envelopes and mail information to parents, students, and staff. The data is divided into categories by user-defined codes so that specific mail can be sent to the appropriate person. A total of 600 names and addresses and 360 organizational codes may be stored. Scott Foresman & Co. Electronic Publishing.

Schoolhouse I* A ten-program package intended as an educational tool for elementary children. They cover such areas as mathematics, spelling, vocabulary, and Roman numerals. Compu-Tations.

Schotky A technology of high-speed circuits.

Science* Lets fifth grade students look at how human bodies tick and how to properly care for them. Disk or cassette. Right On Programs.

Science Lab Database* Two inventory control programs, one for chemicals and one for supplies and equipment. Features search, scan, sort, and print routines. Aurora Systems, Inc.

Science Volume I—Biology/Physics* Junior and senior high school students learn concepts of scientific modeling and apply them to situations like herd population dynamics, the Millikan Oil Drop experiment, and more. Also teaches about radioactive decay, atomic weight, vectors, and isotopes. 32K; disk. Minnesota Educational Computing Consortium.

Science Volume 2* Designed for senior high school students, this collection of science teaching programs includes Snell, which teaches Snell's law and plots angles of light diffraction; Cell Membrane, which places the student in the shoes, so to speak, of a cell membrane; Pest, which discusses pesticide use; Collide, which simulates two bodies colliding; ICBM and RADAR, which demonstrate projections and angles on a co-ordinate system; Diffusion, which discusses gasses and diffusion rates; and Nuclear Simulation, which simulates the rates of decay of nine different radioactive isotopes. Minnesota Educational Computing Consortium.

Science Volume 3* Designed for middle school age children, this series of programs includes Ursa, which teaches constellations; Odell Lake, which teaches the concept of food chains; Minerals, which teaches students to identify twenty-nine minerals using simple tests; Fish, which diagrams the circulatory system of fish using lo-res graphics; and Quakes, which produces a simulated earthquake. Minnesota Educational Computing Consortium.

Science Volume 4—Physics/Chemistry* A series of programs designed to be incorporated into lecture/demonstrations given by the teacher. They provide a series of visual and teaching aids as well as sample questions and answers on each topic. Topics include the Millikan Oil Drop experiment, Charles and Boyles gas laws, and colubility. 32K. Minnesota Educational Computing Consortium.

Scientific Data Base* A database management system for scientific and statistical programs. Store up to 5,000 elements of numerical information for each file. This is the ideal program for programmers who have developed their own scientific analysis programs. Charles Mann & Associates.

Scientific Measurements* Teaches students how to read and understand science laboratory instruments. Includes graduated cylinder, metric ruler, and triple beam balance. Recommended for advanced elementary students. 48K. Micro Power & Light Company.

Scientific Method, The* Older elementary school students will enjoy this simulation and tutorial about the scientific method. 48K. Micro Power & Light Company.

Scientific Notation Numbers in the range 0.01 to 999999999 will be printed as stored. For numbers outside this range (see Number Format) the display will be in scientific or exponential (q.v.) notation. For example, if the number is 123 456 789 150 it will be displayed as 1.23456789E+11; if the number is 0.000 000 000 123 456 789 it will be displayed as 1.23456789E-10. The digits preceding the letter E are called the mantissa, and will always be displayed with one digit before the decimal point. E stands for exponent or the power of 10 (shown by the number following the plus or minus sign) to which the mantissa must be raised to obtain the actual value of the number.

Scientific Plotter* A must program for the science lab. Scientific Plotter produces graphs in hi-res graphics with data from keyboard, disk or programs. Includes the ability to scale logarithmically, plot in quadrants, and scale each axis independently. Labels are automatically added on numeric axes; text labels on charts can be oriented vertically or horizontally. 48K. Sensational Software.

Scientific Plotter* This program takes the data that you put in from the keyboard or disk and gives you graphs that are better than those you could produce by hand. Plot data in one, two or four quadrants. Error bars are included to show range of error for each point. Graph can be erased when you want to and replotted with changes. Five demos are included to show maximum usage. Interactive Microware, Inc.

Scientific Software See AA2.5 Planets; AA3 Planets; Acid-Base Chemistry; Acids and Bases; Advanced Coordinates; Advanced Package (Coordinates); Advanced Package (Relocation); Advanced Solunars; Aestheometry—Volume 1; Almanac; Astro-Mapping; Astronomy; Astronomy—Planets; Astronomy I—Introduction to the Stars; Astronomy II—Studies of 25 Constellations; Astronomy #1; Atomic Structure; Atoms; Biology; Biology Energy and Life; Chem Lab Simulations #1; Chem Lab Simulations #2; Chem Lab Simulations #3; Chem Lab Simulations #4; Chemistry; Chemistry Analysis I; Chemistry Analysis II; Chemistry—Stoichiometry; Chemistry I Disk; Chemistry II Disk; Chemistry with a Computer; Chiron Package; Circular Motion; Completion Progressions and Directions; Comp-U-Sky; Computer Lab in Memory and Cognition; Computers in the Biology Curriculum; Concentrated Chemical Concepts; Crystal Systems; Data Manager for Weather Observations; Digestive System, The; Dinosaurs; Disk Ephemerides; Dual Thermometer System; Ear, The; Earth and Its Composition, The; Eccentricity Form of a Conic; Electricity; Electronic Library Aide; Electronics I, II, III; Elementary—Volume 4—Math/Science; Elementary—Volume 13—Nutrition; EMF of Electrochemical Cells; Energy; Energy at Work; Energy Environment; Enzkin—Enzyme Kinetics; Evolution and Natural Selection; Families of Atoms; Food Facts; Formulas of Compounds Drill; Fundamental Skills for General Chemistry; Gram-molecular Mass; Haber-Ammonia Synthesis; Heart, The; Hurricane Tracker, The; Hurricane Tracking Program; Hygrometer Program; Hypak Heat Exchanger Analysis; IDGame; Introduction to Organic Chemistry; Introduction to Weather Charts; Lab Plots; Lesson-Tutorgraphs; Life in the Ocean; Light; Limacons and their Areas; Liming Soil; Linkover; Magnetism; Mat Man; Matrix Disk Ephemerides (1700-2300); Matrix Professional Disk System; Matter; Matter and Energy; Mechanics; Medical Clinic; Midpoint Rule and Trapezoidal Rule; Midpoints; Mole Concept, The; Motion; Naming Compounds Drill; Natal Horoscope; Natal Horoscope Package; Omni Plotting Package; Organic Nomenclature; Our Bodies; Parans; Parts of the Microscope; pH Concept; Physical Science Baseball—Chemistry; Planet Accuracy; Planetary Guide, The; Plants and How They Grow; Polar Graphing; Prelab Studies for General, Organic, and Biological Chemistry; Printing Package; Pro-Printing Package; Qual; Radioactivity; Rain; Reactions; RKINET;Satellite Tracking Software; Scatter—Particle Scattering; Science; Science Lab Database; Science Volume 1—Biology/-Physics; Science Volume 2; Science Volume 3; Science Volume 4—Physics/Chemistry;Scientific & Games; ScientificData Base; Scientific Measurements; Scientific Method, The; Scientific Plotter; Search Series, Energy Search; Solar Arc Direction; Solar Arcs; Solar Returns; Solar System Astronomy; Solar System, The; Solids of Revolution; Solving the Mysteries of Science; Sound; Space; Star Gazer's Guide, The;Stat Trak; Stoichiometry: General; S3EPACK Module Library; Tell Star; Tequila Sunrise; Thermopak Thermodynamic Properties; Three Body-Orbits; Three Mile Island Special Editor; Time Traveler; Time/Rate/Distance; Titration; Transit Package; Uranian Planets; Uranian Printing; Weather Analyst; Weather and Water; Weather Fronts; Wind Energy Calculations; World Clock; Zebra Finch Genetics; 16K Professional Package.

Scientific Games* Includes conversions, hydraulic calculations, mathematics, and bar graph presentation of data games. American Software & Systems.

SCISPEC SCISPEC is an Apple III Business BASIC formatting feature which allows the user to specify that numeric data be stored and output in scientific notation.

SC/MP Simple Cost-effective MicroProcessor. National Semiconductor's small 8-bit microprocessor.

Scope The scope of a variable or definition is that part of the program in which it may be accessed. Also, an abbreviation for oscilloscope.

Scope Driver, The* Upgrade the power of your Apple and Applescope system to provide a useful oscilloscope. Some features include: storage and recall of acquired signal traces on disk, storage of signal samples in the RAM, monitor display sweep. Additional packages can be added. They include: Digital Volt Meter, Signal Averager, Hard Copy (graphic dump form printer), and Auto-Correlation R.C. Electronics.

Score: The Academic Assistant* Interface your computer with any of three card readers to do fully automated test scoring. You can use raw, percent, or standardized scores, and generate a complete analysis of test performance with clear and easy-to-read reports. All quantifiable test results can be processed, not just multiple-choice tests. Ten programs are included with good documentation and user support. 80-column printer; 48K. Scientific Software.

Scotch A brand of magnetic recording media.

Scotch Plaid* A scotch plaid design is displayed on the screen—an effective example of good graphics. Paul's Electric Computer.

Scotch 3M Head-Cleaning Diskettes* This kit provides you with two "diskettes" made of a white fiber material which absorbs the cleaning solution (that is also supplied in the kit). A small amount of fluid is applied to the lint-free porous material, the disk is inserted into the drive, and the command is given to cause the drive to spin (usually PR#6 to clean drive #1; you'll need a utility program to cause drive #2 to spin, or you will have to swap the drive connectors on the disk drive controller card in slot #6). After thirty seconds, press CTRL-RESET to cause the drive to stop. Remove the disk, and your drive heads should have the dust, dirt, and magnetic oxide particles removed. 3M Data Recording Products Div.

Scotts' Voice Based Learning* Lets you verbally answer screen displayed questions into the Scott Voice entry unit. An aid to develop communication, evaluation, interpretation, and vocabulary skills. Scott Instruments.

SCP Errors SCP error messages are displayed by the Apple III computer if errors are committed while using the System Configuration Program. See System Configuration Program Error Messages.

SCR Silicon Controlled Rectifier. A silicon cell which permits current flow in one direction only, thus effectively converting AC current to DC.

Scratchpad A group of general purpose registers without specific function that serve as a high-speed workspace for some operations. Usually, it is an internal RAM faster than the main system RAM.

Screen The surface of a monitor or TV set on which characters are displayed.

Screen Control Codes ASCII control characters which are recognized by the Apple III's console. When encountered, they require some action of the console or set an operating condition for the console. The screen control codes affect the cursor or the viewport. If a screen control code requires an argument, the argument must immediately follow the control code. There are thirty-two screen control codes used by the Apple III's console.

Screen (Current) Printed on Line Printer See Screen Dump.

Screen—Echo Function Send characters from the keyboard to the screen for visual confirmation of what has been typed. There is no hardwired connection between the keyboard and the screen. The keyboard simply enters characters into memory. The ROM programs of Apple DOS then further copy the characters from memory to the screen, creating a duplication, or echo, of what was keyed.

Screen—Move Cursor Down One Space From the keyboard of the Apple II/II+, enter:

ESC-C
or
ESC-M

This only moves the cursor, it does not erase data on the screen. From a program, enter the BASIC statement:

```
PRINT CHR$(10)
```

or simply press CTRL-J (both keys together) while typing the program line.

From the keyboard of the Apple IIe or III, you may also use the down arrow, in the lower right of the keyboard.

Screen—Move Cursor Left One Space From the keyboard of the Apple, enter:

ESC-B
or
ESC-J

or use the left arrow key. This only moves the cursor, it does not erase data on the screen. From a program, enter the BASIC statement:

```
PRINT CHR$(8)
```

or simply press CTRL-H (both keys together) while typing the program line. Use of CTRL-H will erase data from the screen, as it is equivalent to a backspace.

Screen—Move Cursor Right One Space From the keyboard of the Apple, enter:

ESC-A
or
ESC-K

or use the right arrow key. This only moves the cursor, it does not erase data on the screen. Although using the space bar will move the cursor one space to the right, it also enters data into the line, so cannot be considered a pure cursor move. From a program, enter the BASIC statement:

```
PRINT CHR$(21)
```

If there is already data on the screen to the right of the cursor, use of this statement will copy over whatever data is present as the cursor moves to the right. The copy function is also true when using the right arrow key.

Screen—Move Cursor Up One Space From the keyboard of the Apple II/II+ enter:

ESC-D
or
ESC-I

This only moves the cursor, but does not erase data from the screen.

From the Apple IIe or III keyboard, you may also use the up arrow key. The BASIC statement required to move the cursor up on the screen is VTAB (q.v.).

Screen Director* Gives you the professional edge at meetings and presentations. Lets you recall and display your creations on the computer's monitor, TV, or printer. By using two controls you can scroll, do dissolves or cuts, or even add title slides in many colors and fonts. Business & Professional Software, Inc.

Screen Display, How to Freeze or Hold To freeze the screen briefly while the operator using your program reads a message, just write a delay loop after you print the message. For example:

```
1000 FOR Y = 1 TO 2000
1010 NEXT Y
```

To freeze the screen until the operator is done with it, put in a dummy input statement and instruct the operator to press ENTER to proceed. The input variable (A$) need not be used in your program:

```
1000 INPUT "Press ENTER to continue";A$
```

Screen Dump The term used for transferring the complete contents of the screen to the printer. While it is possible to write a routine to accomplish this function, some printer interface cards cause whatever is being output to the printer to be echoed to the screen, thus changing the screen contents while the program is in the process of reading it. There are some commercial programs available which will perform a screen dump, such as the Text Dump (supplied in Utility City* (from Beagle Bros.) and the graphics screen dump performed by Zoom Grafix*. An additional problem in writing your own screen dump is that the Apple screen locations are not sequential from upper left to lower right, but rather skip seven lines plus skipping an additional eight memory locations at the end of each three such lines! The address locations for each of the twenty-four text lines on the 40-column screen are contained in the following table (each line contains forty different addresses, one for each character position):

TEXT SCREEN LINE #	HEXADECIMAL ADDRESS	DECIMAL ADDRESS
0	$0400-0427	1024-1063
1	0480-04A7	1152-1191
2	0500-0527	1280-1319
3	0580-05A7	1408-1447
4	0600-0627	1536-1575
5	0680-06A7	1664-1703
6	0700-0727	1792-1831
7	0780-07A7	1920-1959
8	0428-044F	1064-1103
9	04A8-04CF	1192-1231
10	0528-054F	1320-1359
11	05A8-05CF	1448-1487
12	0628-064F	1576-1615
13	06A8-06CF	1704-1743
14	0728-074F	1832-1871
15	07A8-07CF	1960-1999
16	0450-0477	1104-1143
17	04D0-04F7	1232-1271
18	0550-0577	1360-1399
19	05D0-05F7	1488-1537
20	0650-0677	1616-1655
21	06D0-06F7	1744-1783
22	0750-0777	1872-1911
23	07D0-07F7	2000-2039

Screen Generator A program which helps define CRT screen forms. Consists of text and symbols on the CRT for data entry and display. Screen forms are often displayed in protected fields and consist of prompts to guide the data entry operator.

Screen Machine* This package will generate a variety of character sets in hi-res graphics. These character sets can be related to the characters on the keyboard. Integer. 32K. Softape.

Screen Pages The screen display draws its information from areas of memory called "screen pages." Text and Low-Resolution Graphics modes share the same screen pages. Page 1 (or the "primary page") is located in RAM at address 1024-2047 (HEX $400-$7FF). Page 2 (the "secondary page") follows immediately at 2048-3071 (HEX $800-$BFF).

High-Resolution Graphics mode has its own two pages. Hi-Res's Page 1 is located at 8192-16383 (HEX $2000-$3FFF); Page 2 at 16384-24575 (HEX $4000-$5FFF).

It should be noted that these "page" numbers do not correspond to the general page numbers used to describe RAM memory locations (see Page of Memory). In fact, the Text/Lo-Res Page 1 occupies four pages worth of RAM—page 4 through 7 (out of 256 pages). Text/Lo-Res Page 2 occupies another four pages—8 eight through 11. Each Hi-Res Page occupies thirty-two RAM pages: Page 1 in RAM pages 32-63, Page 2 in RAM pages 64-95.

The Text/Lo-Res Pages are sometimes simply referred to as "pages." The Hi-Res Pages are likewise referred to as the "picture buffer." Since Text and Lo-Res Graphics share the same memory locations, they cannot be used simultaneously.

Having both primary and secondary pages is useful for animation, since, as one page is being displayed the other page can be drawn; the drawn page is then subsequently displayed, while the first page is redrawn. This allows a fast succession of changing images.

Screen Print To print the information currently on the screen, you must have a screen dump program resident above HIMEM. This screen dump may be designed to transfer text (letters, numbers, characters) or to transfer pictures. To print pictures, you must have a dot-matrix printer with graphics capabilities. Screen dump programs belong in a class of programs called utilities (q.v.).

Screen Scribe* A highly creative utility program. Design unique hi-res characters in unique designs (i.e., upside down, backward, vertical, etc.). Choose one of seven colors. (Adds a little flair to text and symbols.) 32K. Instant Software.

Screen Size A measure of the amount of information that a CRT screen can display. Screens may be measured diagonally, as TV sets, or by the number of vertical and horizontal dot or character positions.

Screen Soft Switches There are eight special memory locations which will determine which type of screen (text, mixed text and graphics, all lo-res graphics, all hi-res graphics, primary or secondary page) will be displayed. The value at these memory locations is immaterial; merely referencing the location will "throw the switch." The switches operate in pairs: turning one on will automatically turn the other member of the pair off. The pairs of switches and their memory locations are shown in the following table.

	Address	
Name of soft switch	Hex	Decimal
Graphics	050	49232-16304
Text	051	49233-16303
All Text or all Graphics	052	49234-16302
Mixed Text and Graphics	053	49235-16301
Display Primary Page (p.1)	054	49236-16300
Display Secondary Page (p.2)	055	49237-16299
Lo-res Graphics mode*	506	49238-16298
Hi-res Graphics mode*	057	49239-16297

*These two modes are only available when the Graphics switch ($C050) is on.

These modes may also be accessed from BASIC by the use of the commands TEXT, GR, or HGR (q.v.).

Screen Up Scrolling Movement of an entire screen of information up or down is a common function in some word processors, but is not available from Applesoft, except by the use of the following program line:

```
nnn FOR X = 1 TO 24 : PRINT : NEXT X
```

Where nnn stands for the line number in your program. This line will print twenty-four blank lines, ensuring that any information on the screen will scroll off the top.

Screenwriter II* A very powerful word processing package with most of the features required for occasional-to-medium-use applications. The program works in both the 40- and 80-column formats. A command chart is furnished with the program for easy reference. CTRL-key functions may differ according to which mode you are executing. 48K. Sierra On-Line Systems.

SCRN BASIC Function. If you are in the low-resolution graphics mode.

SCRN(<n>,<m>)

will return the color code of the point specified.

<n> is the x-coordinate of the point.

<m> is the y-coordinate of the point.

<n> and <m> must be in the range one to forty. See Colors, Lo-Res for a full listing of the colors in Lo-Res graphics.

Scroll Control* Scroll your listings so you can read one screen at a time. This Machine language program is hidden in RAM, so as not to interfere with your program. Can be engaged or disengaged from the keyboard. Softagon, Inc.

Scroll Screen Up See Screen Up Scrolling.

Scrolling Moving the contents of the CRT screen up or down by one or more lines.

SDLC Synchronous Data Link Control. An IBM computer networking protocol.

Search Series, Energy Search* Designed for grade levels five through twelve, this learning adventure is a computer-guided search that teaches critical thinking, science, and social studies. Activities in this simulation include energy plant management and energy research and development. 48K. Computer Learning Connection.

Second Source The manufacturer of a product, but not the original developer.

Secondary Package* A twelve-part program covering areas such as: Function Grapher; Solving Simultaneous Linear Systems; Arithmetic Racing; Limacons and their Areas; Orbiting and Rotating Figures; Sine and Cosine Grapher; Eccentricity Form of Conic; and more. Math Software.

Section 79* Helps you obtain individual data on an employee's eligibility for enrollment for insurance terms and premiums. Values considered include term value, tax cost, taxable income, endowment premiums, and more. A summary sheet can be generated for the department or company. RE/International Systems Corporation.

Sector A continuous section of a disk track. A block of data on a disk is addressed by its track and sector numbers. Apple disk sector size is 256 bytes of data. Consecutively numbered sectors may or may not be physically adjacent within a track. The number of sectors per program is shown to the left of the program/file name when the CATALOG is displayed. On a thirteen sector diskette (DOS 3.2 and earlier) there are 403 sectors available for user information (excluding DOS, VTOC (q.v.), and CATALOG); on a sixteen sector diskette (DOS 3.3) there are 496 available sectors.

Sector, Bad Refers to a sector on the diskette which will not read/write data correctly, usually due to a minor physical flaw in the diskette. One or two bad sectors will not seriously affect the diskette's use; DOS will mark them as bad and avoid using them. More then a few bad sectors indicate the diskette should be used as a frisbee rather than a storage device for your valuable data.

Sectors From June 1978 through July 1979, Apple diskettes were formatted with thirteen sectors per track. With the introduction of DOS 3.3 in August 1979, the format was changed to sixteen sectors per track, with an increase in available storage space per diskette. All diskettes are formatted with thirty-five tracks.

Secuencias* Spanish version of Sequences*. Provides practice in filling in the missing number in a sequence. Grade levels K through one. NTS Software.

Security Plus* Protect the software you write with the Security Plus system. It uses a 2K PROM chip for storing part of your program, and your diskettes for the rest. If someone tries to copy your diskette, he will get a failed program. Stored in the PROM is the program that autostarts the disk, verifies the program, and prints the name of the system on the screen. This complete software protection board comes with 16K of memory. Memory Technologies.

Seed Corn Dealer's System* An accounts receivable system that prints invoices on the Pioneer Seed four-part form and will handle discounting and dealer's finance charge. Other functions include aging of accounts, and customer lists. Computerized Farm Information Systems, Inc.

Seek Time The time needed to position the read/-write head in a drive over the specified track of the disk.

Selling Wet Corn Vs. Dry* Analyzes the relative profitability of three options: drying and storing corn, selling wet corn at harvest, and selling dry corn at harvest. AG-COM.

Semicolon (;) Delimiter in BASIC PRINT Statements. The semicolon is used to concatenate (q.v.) strings and to prevent scrolling up one line when there is a character printed in the rightmost position of a line on the screen. A semicolon at the end of one PRINT statement in a BASIC program will cause the next PRINT statement to begin printing in the subsequent space, even if the two PRINT lines are widely separated in the program.

Senior Analyst* A spreadsheet program that can be used by a number of different people working on the same model. Other advantages include a model consolidation feature, many built-in functions, the ability to define and create the spreadsheet using descriptive names, and outstanding documentation. It is supported by a 48K Apple Runtime Pascal configuration. Apple Computer, Inc.

Senior High Math I Disk* A thirteen-program package with programs such as Quadratic Equations, Simultaneous Equations, Trigonometry, Geometrical Areas, and Verbal Problems (seven levels). 24K. Microphys Programs.

Senior High Math II Disk* The programs in this package include: Verbal Problems, Arithmetic Progressions, Geometric Progressions, Types of Variation, Linear Equations, Coordinate Geometry, Exponents and Logarithms, and more. 24K. Microphys Programs.

Sensible Speller, The* Used with a word processor to check the correct spelling of your text. Developed to operate with many types of word processors on either a single or dual disk drive system. This program runs in a very fast Machine language and compares words either with a comprehensive, 85,000-word dictionary or a special word list of your own creation. Additional features include global add, a word frequency analysis function, and documentation that is clearly written. 48K; two disk drives recommended. Sensible Software.

Sensor A device which translates a physical stimulus into an electronic signal which may, for example, be input into a computer.

Sentences* A program, for elementary students, developed to increase knowledge of sentence structure. 32K. Micro Power & Light Company.

Sequencer In a bit-slice system, the module in charge of providing the next microprogram address to the microprogram memory. It is essentially a complex multiplexer, but may include stack facilities and a loop counter.

Sequences* An elementary school program that requires students to supply missing numbers in numbered sequences selected by the teacher. It is geared toward students in first grade and kindergarten. 32K; DOS 3.2 or 3.3. NTS Software.

Sequential Access An access method in which items may be accessed in a fixed order only. The standard example of a sequentially accessed medium is magnetic tape. Here, in order to access a particular record, all records before it must be scanned first.

Sequential File A file whose elements may only be accessed in ascending order. In order to read an element of a sequential file, all of the preceding elements must be accessed.

Serial Simultaneous handling of processes, transmissions or storage of data. In most microcomputers, parallel I/O conections have eight wires to carry eight bits of a byte simultaneously (or in parallel). Compare this to a serial interface, where only one data wire is available. The eight bits of a byte are transmitted one after another (or serially). The I/O device must collect all eight bits back into one eight-bit byte.

Serial Data Data transmitted sequentially, one bit at a time.

Serial Interface* A low-cost serial interface for your Apple which lets you connect popular serial printers to your computer. The price is kept down by eliminating the features required by other serial communication devices (such as modems). Versa Computing, Inc.

Serial Port An I/O port through which data is transmitted and received serially. Serial ports are often used for communicating with terminals or other computers.

Series Circuit elements connected so that the output of one is the input of the next.

Series Circuit Analysis* Questions on resistance, potential difference, and power are discussed in this program, a tutorial to expand the user's knowledge of electronics. The example cited consists of three resistors and a battery. Microphys Programs.

Series/Parallel Circuit Analaysis* Questions that review concepts of circuits containing one resistor in series with two other resistors in parallel. Microphys Programs.

Service Charge Analysis and Pricing Model* For financial institutions. Gives the manager greater control over profitability of customer accounts by providing stratification by average or minimum DDA balance, and allowing for determination of the effect of pricing decisions prior to implementation. Data Systems, Inc.

Servo Abbreviation of servo-mechanism (q.v.).

Servo-Mechanism A device which converts electrical signals to mechanical or physical actions. Servo-mechanisms range from simple relays to robots.

Set Prefix Command The Apple III File Handling Command Menu on the utilities diskette offers the user several options for working with files. One of these options is the Set Prefix Option which is executed by pressing the letter "P" when this menu is displayed. Prefixes are general classifications of files which can apply to several different levels in the file structure and to several files on the same level in the file structure. See Pathnames for more details.

Set Time Command A command available to the Apple III user from the Device Handling Command Menu on the utilities diskette. This command is executed by pressing the letter "T" when this menu is displayed. It allows the user to associate time and date with file handling applications for the purpose of keeping track of when a file was created, modified, or used. The use of this command from the menu is quite simple, since each step is prompted on screen as the option is executed.

Set Viewport Code One of the screen control codes which may be implemented with the Apple III Graphics Driver. This code is executed by including the ASCII 02 character in a program line. The code requires that four arguments immediately follow it to define the four corners of the viewport. The user must define the left boundary, right boundary, bottom boundary, and top boundary in relation to the lower left corner of the display screen.

Set Write-Protect Command The Apple III File Handling Command Menu contains an option which allows the user to write-protect specific files. It also allows for the cancellation of the write-protection for a file. This option is selected by typing the letter "W" when this menu is displayed. This feature is the same as the lock/unlock feature of DOS.

SETCTAB A subroutine which is available in Apple III Business Basic when the graphics driver is invoked. This subroutine allows the color table to be changed.

Sets* Basic concepts of sets: what they are, how they are used, how they relate to math and real life. Right On Programs.

Setup Time The time required before a signal can be changed from its prior state. Also, the time required to set up the preliminary conditions for a program to run: mounting required disks and tapes, changing printer forms, etc.

Sex-O-Scope* A program that analyzes your sexual potential as seen in your natal horoscope. The language is wonderfully honest and graphics are used to describe sexually strong and weak points.

Based on standard birth information, this program will output a horoscope with text. By John Townley, sexologist and author of Planets In Love. 32K. Matrix Software.

Sex-O-Scope* A tool for understanding your own sexual impulses, as well as those of others. Find out whom your perfect partner would be, what would please he or she, and how to "break the ice" with someone new. AGS Software.

Sexuality Life Dynamic* A self-transforming sexual experience that is highly intuitive and one of a kind! Avant-Garde Creations.

SGN BASIC Function. SGN function gives the sign, positive or negative, of <x>. The format is:

<v> = SGN(<x>)

<x> may be any numeric expression.

If <x> is positive, SGN (<x>) will return 1.
If <x> is zero, SGN(<x>) will return 0.
If <x> is negative, SGN(<x>) will return -1.

S/H Sample and Hold.

Shape Builder* Additional features, such as automatically drawing a line after specifying position for circles and angles, make this an exceptional graphics utility program. It is self-documented. 48K. Telephone Software Connection.

Shape Editor* This program is the companion to Shape Builder*. It allows editing and combining shapes plus documenting remarks. Requires telephone. 48K; telephone transfer. Telephone Software Connection.

Shape Magician, The* Creation of shape tables is made simple with this graphics utility program. A limit of twenty-five units per side and thirty shapes per table are the chief restrictions. Editing may be used for adding or changing shapes. 48K. Dynacomp.

Shape Master* A powerful and versatile program which lets the user create, merge, edit, save, and manipulate images and text in one of five sizes. Mirror-images can also be created. Four games, two graphic demonstrations, and an Instruction Manual are included. 48K. Sensational Software.

Shape Package, The* A three-program package which lets the user draw, color, convert shapes to images, and plot points. 48K. California School for the Deaf.

Shape Table Used to define and then store specific shapes. Each byte of a shape definition is divided into three sections, each of which can specify a plotting vector (one of four cardinal directions), and whether to plot a point or not. While it is possible to create shape tables from scratch, most graphics pictures are now created by the use of commercial graphics programs.

Shape Tables—Volume 1* A maximum of 187 figures and shapes are available to the user on twelve different files. These figures can be combined for use with other programs. Disk. Minnesota Educational Computing Consortium.

Sheep Production Economics* The livestock farmer interested in sheep farming will appreciate this program that evaluates costs vs. returns for sheep farmers. You will need to estimate your production costs; the program will tell you the price at which you should sell to break even, and what return to management and capital can be expected. AG-COM.

Shell The name for the command interpreter running under the Unix operating system.

Shift Moving the contents of a register left or right by one bit or more. The bit falling out goes into the carry bit of the status register, or is lost. The bit coming in is usually a 0.

Shift Register A register whose contents can be moved left or right by one or more bit positions.

Shifter Hardware device whch implements the shift instruction. It moves all bits in a register left or right one bit.

Should You Incorporate?* An aid to professionals who decide whether their clients should incorporate their businesses. The program evaluates changes in taxes and Social Security. Is helpful to financial planners, accountants, attorneys, etc. Vernon Tech Corp.

SI Serial Input. This is sequential input.

Side Effect An unintentional change to the value of a global variable by a function, procedure, or subroutine. Structured programming languages discourage side effects by limiting the scope of global variables.

Sign Plus or minus. In two's complement notation, the sign can be determined by examining bit 7, the most significant bit (MSB).

Sign Magnitude A binary representation for integers where the MSB acts as the sign (0 for +, 1 for -) and the rest of the bits contain the magnitude, or absolute value, of the number.

Signalman Mark I Modem* Packs the state-of-the-art technology into the most compact, versatile modem on the market today. Leading Edge Products, Inc.

Signed Binary A binary representation of signed integer numbers which sets aside one bit, usually the high-order or leftmost bit, to indicate the sign of the number.

Silicon Valley The area around Sunnyvale, California in the Santa Clara Valley, south of San Francisco, where many semiconductor manufacturers are located. More generally, it contains the greatest concentration of electronics industries in the U.S.

Silicon Gate The MOS technology using silicon for the gate of the transistor. An alternative is aluminum gate.

Simple Machines* An educational program for children, grade levels five and up, that demonstrates how and why levers, pulleys, and other simple machines work. 32K. Synergistic Software.

Simple Machines* Offers instruction for the use of and examples for the operation of six simple machines. Includes lever, pulley, screw, wedge, inclined plane, and wheel and axle, and concludes with a helpful quiz. Micro Power & Light Co.

Simple Multiplication and Division* An introduction to multiplication, division, and numbers. Right On Programs.

Simplex Data transferred in one direction only.

Simulated Computer* An introductory lesson to computer programming. Ten commands help you become familiar with the principles of computer technology. Eight error messages will debug programs. Detailed documentation is included when additional help is needed. Disk or cassette. Steketee Educational Software.

Simulator A program which models a device or process by having the same input/output behavior as the device simulated. A CPU is easily simulated but I/O cannot be precisely simulated because of timing considerations, so only the logic of a program can be tested with a simulator.

Simulators* A 6502 becomes an 8080. Cassette or disk. SYBEX, Inc.

SIN BASIC Function. The SIN function calculates and returns the trigonometric sine function. The format is:

<v> = SIN(<x>)

<x> is the angle in radians.

To convert degrees to radians, multiply by $\pi/180$; $\pi = 3.141593$.

Sine and Cosine Grapher* Dramatically shows the student the effects of amplitude, period, and phase shift changes when dealing with the effect that the constants A, B, and C have on the graphs of the functions y=Asin(Bx+C) and y=Acos(Bx+C). 32K. Math Software.

Sine Wave An oscilloscope pattern, representing electrical action, that is in the form of a sine curve. Such a curve has a maximum value of +1 and a minimum value of -1 on the y-axis, and crosses the x-axis twice during any one cycle. Thus the curve represents the values of the sines of all angles from 0 to 360.

Single Albums* A series of music albums that are pre-programmed on disks. Includes a wide variety of selections, from classical to Christmas music. Used with the Music Cards MC1 and MC16. ALF Products, Inc.

Single Board Computer A complete computer on one printed circuit board: CPU, ROM, RAM, and interfaces. Single board computers are often used for industrial control applications.

Single Disk Sort* Sorts a full disk of data with up to ten key fields. Compatible with Filemaster*, Pascal Language System*, and Sorrento Valley's 8" Disk Controller*. Datacope.

Single Precision Arithmetic Applesoft will work with numbers containing up to nine digits. Double precision, the ability to work with numbers up to eighteen digits, is only available on the Apple by using subroutines which convert the number to a string and operate on the individual digits or characters of the string, or with special Machine language programs. See STR$ and Number Format.

Single-Density Diskette Format Disk drives which operate with single-density place the tracks so they are separated from each other; there are twenty-four tracks-per-inch. The 5 ¼ inch floppy diskette pertains to the measurement of the diskette's sleeve. The actual recording surface available between the edge of the diskette and the center hole is about 1 ½ inch radial measurement. Some diskettes are double-density, but the Apple disk drive will still format the diskette with single-density spacing. If the disk drive is double-density, then it will place the tracks closer together. On double-density diskettes the magnetic impulses, which are actually the information stored on the diskette, will not interfere with each other. This resolution of information is a function of the size and regularity of the magnetic particles deposted on the recording surface.

Single-Sided A method of disk storage using only one side of the disk as used in the Apple drives.

Also, a printed-circuit board with printed-circuit wiring in only one side.

Single-Sided Diskette Drive The Apple drives contain only one read/write head. This head operates in such a way to place the information on the bottom side of the diskette, or the side away from the label. See Diskette Formats for a complete explanation.

Single-Stepping Refers to the execution of a program one statement or step, at a time. It is useful for debugging. See Debugging.

Single-Strike See Type Formats—Printer.

Sink Current A logic family's current drive capability. Sink current is 1.6 millamperes for one standard transistor-transistor logic (TTL) gate.

SIP Single In-line Package. A package for a chip which has a single row of pins, usually few in number (2-8). Contrast this with dual-in-line package, where up to 100 pins are often used.

Sir Isaac's Yield Calculator Serves to determine present value, accumulation of cash flow at a specific interest rate, and yield. To determine yield, you must use the starting value, cash flow, and ending value. Because it is written in compressed form, it runs very quickly. It serves a somewhat limited market because of the limited number of problems it solves.48K. Isaac Software.

Sir William Wrong Note* A complete package that lets one detect pitch error in any combination of four-voiced chord types that you choose, from major or minor to sevenths and augmented sixth chords. This program will visually display the notation of the user-selected chord and then the user will hear the chord with the one discordant sound. The user's job is to identify the discordant sound. User can compare the correct and wrong sounds for each chord and then review each student's use of the program. 48K; Micro Music, Inc.

Sir William Wrong Note* Practice pitch error detection in this musical program. Working from the visual notation of the chord, the computer sounds the chord with an error, then you identify the incorrect sounded note. Includes a grade card review for each participant. Requires an MMI DAC Board. Rainbow Computing.

Size in Sectors of Files The minimum size for any file on a diskette is 2 sectors or 512 bytes of data. See CATALOG, Track Orgnaization.

Size Print—6 Lines per Inch See Printer—6 Lines per Inch.

Size Print—8 Lines per Inch See Printer—8 Lines per Inch.

Size Print—72/7 Lines per Inch See Printer—72/7 Lines per Inch.

Size Type—Compressed Print For compressed print (small type size) enter BASIC statement:

```
PRINT CHR$(15)
```

either in a program with line numbers at the point you want to start printing in the small type or directly without a line number. This gives 132 characters on the eight inch line, or about sixteen characters per inch. To return to normal size print, enter:

```
PRINT CHR$(18)
```

See Type Formats—Printer for more information and examples.

Size Type—Normal Size Print To return to normal ten characters per inch print size, you must turn off all non-standard print options now turned on. See Type Formats—Printer for more information and examples.

Skip Over Print Zones Use of double comma. See Print Zones.

Skip to Top of Page Form feed on printer. Enter BASIC statement:

```
PRINT CHR$(12)
```

Or use the "top of form" or "form feed" manual control button (FF) on the printer.

You may then need to adjust the paper in the printer so it actually is at the top of a page as defined by the perforations. In a program, you may want to provide instructions to the operator and a pause (q.v.) to allow for adjustment of the paper.

Slave Any device under control of another device, or imitating its operation.

Slew Rate A fast signal response measured in volts per second. Used in operational amplifier specifications.

Slice See Bit-Slice.

Slick Switch* Lets you change between 40- and 80-column modes on the Sup 'R Term* without plugging and unplugging wires and cables. Installation requires no soldering and the switch fits into one of the slots on the back of the Apple. Korsmeyer Electronic Design.

Slide Select Program* Quickly retrieve, control, and automatically display hi-res graphics. 64KC or 128K DE card. Legend Industries, Ltd.

Slide Show* A maximum of twenty low- or hi-res pictures can be loaded and displayed with this graphics driver. The menu and pictures may be shown immediately upon request. 48K. MPA Enterprises.

Slide Show, The* A maximum of seventy-five "slides" can be automatically sequenced to give a movie simulation on your TV set. Up to twenty transactions are included for special effects (i.e., ripples, overlay, fades, etc.). 48K. C & H Video.

Slideshow* Software designers can use this tool to document their programs for the user. Explanations of the program, menus, and applications are incorporated in sequence so that the user understands the purpose of the program without bothering with the technical details. Tutorial aids, such as demonstrations, graphs, and presentations are included. Micro Focus.

Slot A multiple-way connector allowing one printed circuit board to be attached to another. Typically an accessory board is plugged into a slot in the motherboard.

Slot Swappers* A switch that lets you instantly interchange any two slots (except 0) and avoid costly burned chips due to slot dependency. It is a plug-in module that is easily installed. Southwest Edpsych Services, Inc.

Slot 8 With Extension Switch* Convert Slot 7 of your Apple to a dual holder to give you nine peripheral expansion slots. You can switch from one slot to the other with an external control switch. Legend Industries, Ltd.

Slots At the back of the Apple computer motherboard are expansion slots for the addition of various controller cards for peripheral devices, memory expansion boards, or peripherals (such as an 80-column display card; a Z-80 card to permit use of the CP/M operating system; etc. On the Apple II/II+, there are eight such slots; on the IIe, there are seven toward the back, available for peripheral cards (each of these is a 40-pin slot, as on the Apple II/II+) and one auxilliary slot toward the center of the motherboard which is a 60-pin slot. This slot is used only for the 80-column card and its additional RAM memory.

Slow List/Stop List* Control the speed of your program listings with Apple II's game paddles. The speed at which disk catalogs appear can also be controlled. Hayden Book Company.

Slowprint Driver A special driver constructed by the user of an Apple III and configured to operate a letter quality printer. This driver would be loaded with the System Configuration Program.

SLSI Super Large Scale Integration. A technology which holds up to 100,000 transistors per chip.

Small Business Software* There are four parts to this accounting package: Micropay (accounts payable), Microrec (accounts receivable), Micropers (payroll/personnel), and Microinv (inventory control). These produce a large number of reports including general ledger, audit trail of transactions, profit and loss statements, balance sheets, chart of accounts, and more. Compumax.

Small Group Roster* Local organizations can keep their membership lists up-to-date, store member information, and generate mailing lists with this useful program. Disk Depot.

Small Scale Integration The technology which holds up to ten gates per device.

Small Type Size See Size Type—Compressed Print.

Smalltalk A language and software system developed by the Learning Research Group at the Xerox Palo Alto Research Center (PARC) during the years 1971-1980 and released in 1981. Smalltalk incorporates two fundamental concepts: objects and messages. Smalltalk systems are characterized by a high degree of pictorial interaction.

Smart* A versatile, economics package that presents economics data in clear graphic formats, lets you call up financial data from national information services using a modem, performs automatic analysis of averages and on-balance volume, maintains account positions, regenerates charts using different variables, gives your computer networking capabilities, and is expandible. Software Resources, Inc.

Smart Analyst and Graphics Package, The* For the investor who wants to graphically see any change experienced by his investments. The program can hold a large number of records that cover a wide range of securities. Data can be edited, updated, or represented on a number of graphs. These graphs will make analysis easier and help project future trends and decisions. Software Resources, Inc.

Smarterm* Install this display board on your Apple computer and you will have an 80 by 24 display that is easy to read and comes with many additional features, including a shift key, inverse video in BASIC, automatic switching to 40-column display, and a standard 5 by 7 matrix character set. This board is compatible with most of the software packages available for the Apple computer. Advanced Logic Systems.

Smartmodem* A top performing data communications system designed for the small computer. It is the most sophisticated 300 baud originate/answer modem on the market today and is also easy to use. Lets your computer communicate with other computers or timesharing systems in North America. All circuitry needed for the auto-dial, auto-answer features is built into the unit so no extra equipment is necessary. This unit is programmable in any language. Thirty commands can be entered from the keyboard. FCC approved for direct connection to telephone lines, consequently eliminating the distortions associated with acoustic couplers. The audio monitor lets you listen to the connection being made and, if the line is busy, it will re-dial the call for you. Provides an excellent variety of applications and represents the state of the art in data communications systems for small computers. Hayes Microcomputer Products, Inc.

Smartype* Turn your Apple Silentype printer into a high quality text printer. Adds new character fonts; true descenders on lower case characters; sixty, eighty, ninety-six, and one hundred and twenty characters per line. Also has a utility to dump hi-res graphics to the Silentype. Softsmith.

SMI Static Memory Interface.

Smoke Test Turning on the equipment for the first time to see if it will operate.

SMS Scientific Micro Systems, a manufacturer.

SNOBOL StriNg-Oriented symBOlic Language. A character-string manipulation programming language.

Snowatch* A specialized microcomputer software package for radio and TV stations that organizes schools, factories, and businesses with code numbers so local stations can broadcast openings and closings efficiently and without confusion. Snowatch also lets you attach special messages, which can be changed or updated, to any listing. Full recovery capabilities are included if your power is lost. Snowatch is user friendly and menu-driven. Media Service Concepts.

SNR Signal to Noise Ratio.

SO Shift-Out bit. The bit lost (or stored in the carry status register) when a word is shifted left or right.

SOAP (Stock Option Analysis)* A program that allows you to calculate and graph profits or losses on option trading. Features high-resolution graphics, record keeping capabilities, and a mock scenario tool for novice investors. 48K. H & H Scientific.

SOB Start Of Block.

Soccer Math* Soccer players are graphically displayed to provide a game-like atmosphere for learning addition, subtraction, and multiplication. A correct answer makes the player kick the ball, while incorrect answers mean the ball is missed. Compu-Tations.

Social Studies—Volume 1 (Senior High)* A series of social studies simulation programs, including Limits, which deals with the resources of the future, three presidential election programs, a U. S. population projection simulation, and a program dealing with future energy supplies. Minnesota Educational Computing Consortium.

Social Studies—Volume 2 (Senior High)* More programs in the social studies series, including four concerning states, countries, capitals, and continents. Others include agriculture, collective bargaining, nuclear war, and crime control. Minnesota Educational Computing Consortium.

Social & Economic Simulation* An excellent package of three programs suitable for students of high school social studies. In Limits, a microcomputer takeoff of an MIT study "Limits to Growth", the object is to produce a stable world without collapse due to unlimited growth. You deal with six variables (birth and death rates, food production rate, rate of resouce use, industrial growth, and pollution rates) to control industrial output, pollution, population, food supply, and resources. In Uspop, you can study the projected population changes for the future. Market teaches elementary business concepts by presenting two competing companies in the marketplace. The object is to clear a profit while dealing with factors such as production level, advertising budgeted and unit prices of products. 48K. Creative Computing.

Socket A mechanical electrical connector. The socket is also known as the female connector.

Soft Seventy* Gives you a 70-column display of 4 by 8 dot matrix characters with Apples hi-res screen. With Soft Seventy you can mix text and graphics. Ideal for word processing, business, or games applications. Synergistic Software.

Softalk* Apple-oriented magazine. This monthly publication contains extensive listings of software, monthly "Top Ten" and "Top Thirty" listings, articles about people in the industry, and several monthly columns, including those dealing with Assembly language, BASIC, Apple III, CP/M, and DOS. Also included is a monthly section on new product information and reviews. See Magazines for detailed subscription information.

Softcard* Run the CP/M operating system, Microsoft BASIC-80*) and other CP/M-based software on your Apple computer with this hardware/software package. Six utility programs are also included. This useful board comes with over 500 pages of instruction and documentation. Microsoft Consumer Products.

Softcard Premium System* The full power of CP/M-80* and all the software written for this operating system comes with this package, that contains three add-on boards for your Apple computer. Included are Microsoft's RAMCard, The Videx Videoterm 80-column card, and the Microsoft SoftCard (which contains the Z-80 microprocessor, Microsoft BASIC, and CP/M-80). Microsoft Consumer Products.

Soft-Fail Techniques that preserve a degree of system operation despite failures.

Softline* Computer games magazine. A magazine that contains discussions on how to get higher scores on some games, listings of games which you can enter yourself, and a running list of reported high game scores. Several different computers are covered by this magazine. See the listing under Magazines for subscription information.

Soft-Sectored A disk format where the beginning of every sector is detected by reading magnetic marks on the disk (used by the Apple). This is in contrast to hard-sectored, where each sector's origin is marked by a physical hole.

Softside* Computer-oriented magazine. SoftSide publishes articles of general interest applying to several different computers. Depending upon your request at the time of subscribing, they include a "tear-out" section with two to four program listings per month especially for your machine. These publishers also produce a Disk Version and a Cassette Version of the magazine with expanded programs, but also with a considerably higher price. The use of tear-out inserts does not allow direct comparison of program listings for different computers; you may order the tear-outs separately for other computers if you wish. See the listing under magazines for subscription information.

Soft-Step* Debug your Applesoft programs. This program 1) examines your BASIC program, statement by statement; 2) sets breakpoints where you want your program to pause; 3) predefines commands to execute whenever the debugger pauses; 4) sees the next line to be executed; 5) traces all or selected lines; 6) prints the value of any variable or PEEKs into memory addresses; and 7) changes a variable value or POKE values into memory. Accent Software.

Software Computer programs of all kinds are termed software. Usually software is contrasted to hardware—the actual chips, wires, boards, etc. which make up the computer. A special case is read-only memory (ROM) (q.v.), which is hardware that contains a permanent copy of software. Shorthand terminology here could be confusing, such as "a BASIC ROM," which means a ROM (hardware) containing a copy of a BASIC interpreter program (software). Such ROMs are often called firmware to distinguish them from non-program hardware and from software in changeable media (RAM, diskette, cassette, etc.).

Software, Applications A software package is a group of computer programs, including data files and documentation, to perform a function, or group of related functions, on the computer. These programs are called applications software when the programs are devoted to a user task (e.g., a word processing package, an accounting package, etc.). These programs are called systems software packages when they facilitate the use of the machinery (e.g., a database management package, a disk operating system, or a program development package).

Software, Operating Systems See CP/M, DOS, and SOS.

Software Pac #1 (Some Common BASIC Programs)* Includes seventy-six programs from the book *Some Common BASIC Programs* by Osborne/McGraw-Hill. Features Statistics, Finance, Math, and Miscellaneous. Basic Business Software, Inc.

Software Pac #3* A series of programs including Chi-Square Evaluation, Poisson Distribution, Linear Regression, Binomial Distribution, Bivariate Normal Distribution, Geometric Distribution, Weibull Distribution, and Anova. Basic Business Software, Inc.

Software Pac #4* A financial calculations package. Calculate present and future values, interest rates and periods, bond coupon and discount rates, annuity formulas, return on investment information, and more. Tape or disk. Basic Business Software Co., Inc.

Software Pac #7* A two-program package to compute and output depreciation and amortization schedules. The amortization program gives payment amounts, principal and interest breakdown, remaining balance, yearly summaries and total interest paid reports. The depreciation segment formats output of monthly and yearly totals for four different methods of depreciation, and calculates the present values for asset life. Basic Business Software Co., Inc.

Software Package A pre-written group of commercially available programs designed to serve a specific need, such as word processing, inventory control, database management, etc.

Software-Compatible Describes CPUs which can execute the same instructions (i.e., have the same Machine language).

Soil Test Recommendation* You input to the program data from your soil test results, and supply information about the kind and quantity of crops you intend to grow. The program will determine the amount and type of fertilizer you will need as well as your application options. H.C.I.

Solar Arc Directions (An Astrology Program)* User can choose chart wheel or a list of planet positions and angles (RAMC, MC, AS, VT, EP) for radix. An aspectscope with aspects, angular separations and midpoints are included in the wheel option and a more detailed aspectscope is available which provides a list of angles, part of fortune, and a table listing of planets in the house cusps. An indication of applying/separating aspects and the number of degrees and minutes each aspect is out-of-orb is included. A list of planets in aspect analysis is in zero Aries point. A solar arc scan using the true, mean (Naibod) or degree-for-a year movement of the sun is available, as well as a year's worth of solar arc contacts supplied with the current planet position (by solar arc), aspect due, and calendar date when radix are shown. 16K. Matrix Software.

Solar Arcs* Will print a lifetime list of solar arc lengths at intervals of three months. AGS Software.

Solar Returns* Uses a wheel-with-aspectarian format for sidereal, topical, or procession-corrected tropical return. Also handles converse returns and demi-, quarterly-, and similar returns. AGS Software.

Solar System Astronomy* An educational program suitable for high school and college students, that is descriptive rather than mathematical in nature. Covers the basics of the solar system. The nine planets and their moons are described, each planet is shown in orbit around the sun, and the history of the solar system is included. Lessons are presented in hi-res graphics and some lessons are animated. 48K. Cross Educational Software.

Solar System, The* Teaches younger children about the sun, the moon, the stars, and other planets. Includes a quiz section and a game for testing comprehension. Disk or cassette. Right On Programs.

Solar System, The* Learn about the solar system, the planets, moons, and the earth's atmosphere using ten hi-res color graphic screens. Also introduces other presences in the astronomical universe such as supernovas and comets. 48K. Versa Computing, Inc.

Solar & Lunar Returns (An Astrology Program)* Tropical and sidereal zodiacs supported with or without effects of precession. Correct solar and lunar returns can be erected in the house system you choose. Calendar date and GMT for return are listed. This program will provide both solar and lunar demi-returns, and the user may choose to look at subsequent lunar returns in a row. User may enter a zodiac positon and cast a chart for return of moon to that position on lunar returns, so that sensitive points (MC, ASC,) may be investigated. In the chart wheel center, aspects can be viewed with angular separation. 16K. Matrix Software.

Solid-Apple Key (Apple III) The Solid-Apple Key on the Apple III computer is used to increase the speed of automatic repetition of any key which is in the automatic repeat mode. It increases the speed of repetition from eleven characters per second to thirty-three characters per second.

Solids of Revolution* The user can choose various objects and use areas within the object to revolve about an axis. Paddle controls are used for the rotation functions. 32K. Math Software.

Solving Linear Equations* Linear equations are presented graphically and both computer and user-designed solutions are provided to isolate the variable. The second part of the program allows individual practice in solving equations. This program is especially good for the student who needs additional tutoring. 48K. Math Software.

Solving Simultaneous Linear Sytems* A reinforcement of the multiplication-addition method of solving two linear equations in two unknowns, either as a demonstration or as a practice program.

As the student works, appropriate error messages are displayed to aid him. Math Software.

Solving the Mysteries of Science* A series of ten programs each, including twenty-four lessons and each addressing fifteen complex questions. These programs are designed for high school level students for independant study in conjunction with correlated text-based classroom work. All program units are interactive and branch differently depending upon the student's response to questions. Correct answers are positively rewarded by advancement to the next question, while an incorrect answer will prompt another try. The teacher may retrieve a record of any student's responses to question segments; the program will also print tests to be taken by all students at their desks. Topics are: light, the universe, the weather, the planet earth, chemistry, plant life, animal life, sound, machines, and the human body. 24K. VMI Visual Materials, Inc.

Some Common BASIC Programs* A package of seventy-six programs that are included in the book of the same name, published by Osborne/McGraw Hill. Both the disk and book come in this collection. The programs are divided into groups: business, mathematics, statistics, and miscellaneous. High Technology Software Products.

Songs in the Key of Apple* You can see and hear your own compositions or selections of pre-programmed music. Hayden Book Company.

Sophisticated Operating System (SOS) Apple III's operating system is called the Sophisticated Operating System (abbreviated to SOS). SOS must be loaded from a disk each time the system is booted. It allows the Apple III to communicate with internal and external devices by using programs called device drivers. Devices include character devices such as the console and a printer, and also include block devices such as disk drives and retrieval of data. The Apple III system can be configured to use a large variety of devices through a System Configuration Program. SOS also provides the means of using files. Files may be programs, discrete data, and subroutines. SOS provides the means for the Apple III user to access all of the features of his computer system as required. See Pathnames for an explanation of the SOS file structure.

Sorting Algorithms BASIC. There are many different algorithms (q.v.) to sort information which is contained in an array. Among these are the Bubble Sort, the Shell Sort, and the Pointer Sort. The easiest to remember and code is the Bubble Sort, although it is the slowest in execution because it often makes more swaps than are necessary.

The BASIC coding requires that the information be stored in an array (q.v.) and that the subscripted segments of the array be traded through the use of a temporary variable. The coding is as follows (remember you will need to change the line numbers to fit your program):

```
 90 SW = 0
100 FOR I = 1 TO N -1
110 IF A(I) < A(I + 1) THEN 160
120 T = A(I)
130 A(I) = A(I + 1)
140 A(I + 1) = T
150 SW = 1
160 NEXT I
170 IF SW = 1 THEN SW = 0 : GOTO 100
```

This will arrange the elements of the array in ascending order from least to greatest. If you wish the order reversed (decending), change the operator in line 110 from < (less than) to > (greater than).

SOS Silicon-On-Sapphire. Integrated circuit technology in which a sapphire substrate is used. Yields high speeds of operation.

SOS Sophisticated Operating System. (Pronounced "soss.") Used in the Apple III.

SOS Errors If SOS encounters some condition which prevents system operation during the process of booting the Apple III system, a SOS error message is displayed on the screen. The error conditions, error messages, and possible remedies are described below:

Message/Condition	Cause	Remedy
Blank Screen	Diskette in drive is not a boot disk	Retry with boot disk
RETRY	Boot process failed	Remove disk and insert again. Attempt reboot
DRIVE FILE NOT FOUND	Disk has no file called SOS.DRIVER	Add drivers with SCP

Message/Condition	Cause	Remedy
DRIVER FILE TOO LARGE	Memory too small to hold all drivers	Delete enough driver files to fit
EMPTY DRIVER FILE	Driver file has no drivers in file	Add appropriate drivers with SCP
INCOMPATIBLE INTERPRETER	Interpreter too big or specifies wrong memory location	Check SOS version
INTERPRETER FILE NOT FOUND	No SOS.INTERP file on disk	Add to disk
INVALID DRIVER FILE	SOS.DRIVER file in wrong format	Delete and add valid file with SCP
I/O ERROR	I/O error found when loading kernel, interpreter or driver	Reinsert disk and try again
KERNEL FILE NOT FOUND	No SOS.KERNEL file on diskette	Add from another disk with filer
ROM ERROR: PLEASE NOTIFY YOUR DEALER	Old Boot ROM in computer	Take to dealer and replace
TOO MANY BLOCK DEVICES	SOS.DRIVER has too many block devices	Delete as many as is required

SOS Kernel The Apple III computer carries out its functions and its communications with external devices through the use of SOS (Sophisticated Operating System). The SOS Kernel is the portion of the operating system which directs the flow of communications (data) within the computer's circuits and with external devices.

SOS.DRIVER The SOS.DRIVER File is the currently configured collection of drivers available for use by the Apple III system. This file was stored on a boot diskette by the Generate New System option of the System Configuration Program menu. The System Configuration Program can be used to alter this file by adding drivers to the file or deleting drivers from the file.

SOSclock III* Gives you calendar and clock operations for your computer. The complete kit provides use of reserved variable times and dates in Business BASIC; use of procedures date, set time, and time of day in Pascal; and complete use of the system calls set time and get time. Handbook included. Systems Fabricators.

Sound* Presents basic sound-related concepts by giving students easy to understand examples as demonstrations. Includes a game to reinforce the concepts. Disk or cassette. Right On Programs.

Sound* Sound-related topics include, wavelength, frequency, and speed of sound, diffracion, refraction, and interference. 48K. J & S Software.

Sound On* A collection of sound effects and short melodies which can be added to your programs to make them more interesting. Indian Head Software.

Sound Processing Units See AI02-VS Voice Sensor; Alpha Syntauri; Alpha 2; Apple Electric Mouth; Apple Music; Multimusic; S.A.M. (Software Automatic Mouth); Scotts Voice Based Learning; Soundchaser Digital—Basic System; Soundware Music Box; Speech Synthesizer; Supertalker; Type 'N Talk; Voice Entry Terminals; Voice Input Module; Voter 30; VT-100 Emulator.

Soundchaser Digital—Basic System* A four-octave AGO standard keyboard that includes interface card and music system digital synthesizer cards. Offers Turbo-Traks Digital Performance Software, polyphonic synthesizer, sixteen digital oscillators, over one hundred preset sounds, multi-track sound-on-sound recording, and ability to create waveform programs. 48K. Passport Designs, Inc.

Soundware Music Box* May be programmed by the user and can generate sound for games. United Software of America.

Source The emitter of a transistor.

Source, The* An information and communications service offering you current news and sports. It can make hotel reservations, send mail across the country, access hundreds of information sources, bring you educational programs and games, and help you manage your finances. A one-time subscription fee gets you started, with hourly fees for the use of the service. Also offers Source Plus (an executive reading service), Media General Financial Service, Legi-Slate, Commodity News Services, Inc., and Comp-U-Star (for a slightly higher fee). Requires micromodem, acoustic coupler or direct-connect modem, and communication card. The Source Telecomputing Corp. A subsidiary of the Reader's Digest Association, Inc.

Source Code A synonym for source program (q.v.).

Source Drive The diskette drive where information/data is coming from. Target drive is the diskette drive where information/data is going.

Source Language The original language used by the programmer, on which a translator program operates to produce a version in the language used by the machine.

Source Program A file which contains data to be processed by a language processor or interpreter. This is a matter of function rather than contents. For example, suppose you write a BASIC program called SAMPLE. This is a source program. If you then submit it to a BASIC compiler (q.v.) to produce a fast object program, the compiler will treat SAMPLE as its input data rather than as a program to be executed. The BASIC compiler will produce an object file which contains translation of your source program into the 6502 Machine language.

A BASIC source program looks more like a document text file than like an executable program. Therefore, it is how a file is used (or usually used) that determines whether it is a data file, a program, or in the case of a source program, sometimes one and sometimes the other. But in general, a program file contains some type of program instructions specifying how data is to be processed, while a data file contains the data that will be processed. See Program, Source; Program, Object; BASIC Interpreter; and BASIC Compiler.

Source Programs All programs that run directly on the Apple are Machine language programs, in the actual numeric instruction code of the Apple's 6502 microcomputer chip. Most were orginally written by a programmer as text files known as source programs. The source program contains relatively readable statements in a language such as FORTRAN, COBOL, or BASIC. These were then translated by a compiler program, producing an object program.

The object program contains the Machine language instructions (for the Apple's 6502) which correspond to the instructions of the original source program. BASIC programs work in this way with a BASIC compiler.

Regular BASIC works in a slightly different way. An interpreter program in ROM takes each line of your BASIC program and processes it before operating on the next line. Since it must reinterpret your source program each time you run it, interpreted BASIC can be as much as 100 times slower than compiled BASIC, but compiled BASIC takes much more storage space, both in computer memory and on disk.

Soybean Harvest Losses* If you know it was a bad year for soybeans and you want to know just how bad, (especially if you want to know why), this is the program for you. AG-COM.

SP Stack Pointer.

Space Binary 0 (zero). In the RS-232C standard, negative voltage; in a current loop, no circuit flow; and in modems, the lower frequency of the pair. Also, commonly used as a synonym for the blank character.

Space—on the Print Line To leave space on the print line between items, put an extra comma (,,) in the print list.

Enter BASIC statement:

```
PRINT A,,B
```

This would print A in print zone 1, nothing in print zone 2, and put B in print zone 3, (col 33).

See Print Zones and Print Lines.

Space—How to on Printer A PRINT statement with no other specifications will print a blank line (that is, just feed the paper up one line and return to left margin) so you can format your print out neatly.

Space* Full of facts about the planets in our solar system, including our dear earth. Information Unlimited Software.

Space Mouse* A math game which involves the multiplication and division of fractions. A space mouse must be trapped by the student's skills. The student specifies the size of the bait with which he wants to tempt the mouse; the bigger the bait, the harder the problem. 48K. Zeitgeist.

Space Scanner* A math drill space invaders game where the objective is to operate the battle map which gives the warp and vector of the enemy. The "intercept" is determined by the result of the student's multiplication or division abilities. If correct, the enemy is destroyed. If not, watch out—you may be zapped. 48K. Zeitgeist.

Space Tablet, The (A 3-D Graphics Tablet)* This program operates as a graphics tablet with three dimensional input possible. Allows you to draw or trace maps, graphs, and pictures and then edit them from different angles. Designs can be created in either two or three dimensions. Available in three or four axis versions. Requires paddles or joystick. Microcontrol Systems.

Space Up One Line To advance one line on the printer (space up) without a carriage return, enter BASIC statement:

```
PRINT CHR$(10)
```

or use "line feed" button (LF) on printer.

Entering just PRINT gives a line feed—both a space up one line (line feed) and a return to left margin (carriage return).

Spaces Leave in print line. See Print Zones.

Spaces in PRINT BASIC. Print Lines and Print Zones.

Spacing in BASIC Print Lines See Print Zones.

Span* Conjugation of some regular Spanish verbs in four tenses. Tape 'n Text—Williamsville Publications.

Spanish* Teaches Spanish with more than 800 entries that have this format: Spanish/English, English/Spanish, synonyms, and foreign phrases/English. The database is divided into files like Easy Verbs 2 and Hard Nouns 1. Beginning through intermediate level. Sliwa Enterprises.

Spanish for the Traveler* Are you planning to travel in a Spanish-speaking country? Is Berlitz too expensive, after you've just bought the latest gadget for your Apple? Then this program may be the one you want. It comes with a diskette and four cassette tapes (seven recorded sides) that work together so you can both see and hear the words together. In addition, there is a seventy-two page Manual with commentary on the materials and a complete list, with translations, of all the words and phrases in the lessons.

Following a run-through of the words for a lesson, you are given a change to see them again, take a quiz, or return to the menu to select another list. When taking a quiz, you may select to have the "questions" appear in either Spanish or English; then you must select the correct answer from the numbered (for vocabulary quizzes) or lettered (for unit tests) answers. A number will show in the bottom right-hand corner indicating the number of seconds you have accumulated in answering the questions for that section.

You are limited to making three backup copies of the master diskette. The diskette comes with its own copy program (Copy A will not work) and is designed to work with a single drive "for maximum reliability of the copy." This puts a burden on the user to exercise extreme care in swapping diskettes between the read and write phases of the copying procedure. It is possible to FIND individual files without affecting the copy counter, but presumably using this method will still leave you without a necessary part of the entire system. Southwestern Data Systems.

Spanish Hangman, The* A fast-paced program that uses the hangman format for 1600 words and 450 sentences (including Spanish idioms). 32K. George Earl.

Spanish Vocabulary Drill* A drill and practice program for Spanish/English, English/Spanish. Includes practice files the user can develop additional files. For elementary through college levels. Compu-Tations, Inc.

SPC BASIC Function. Causes <n> spaces to be skipped between the last item PRINTed and the next item PRINTed, if semicolons are used before and after the SPC command. The SPC command must be used from within a PRINT statement. Example:

```
PRINT A; SPC(3); B
```

SPDT Single Pole Double Throw. A type of switch.

Special Characters BASIC. The following characters have special meanings in Applesoft BASIC. These characters cannot be used to have meanings other than those stated below:

+	plus sign or concatenation symbol
-	minus sign
/	slash or division symbol
*	asterisk or multiplication symbol
^	caret or exponentiation symbol
%	percent sign or integer type declaration character
#	number (or pound) sign or slot designation
$	dollar sign or string type declaration character
&	ampersand; calls ROM subroutines
,	comma or print zone delimiter

Continued

(Special Characters Continued)

'	apostrophe
;	semicolon
:	colon or statement separator
?	question mark or PRINT abbreviation
___	underline (Apple IIe, III only)
"	quotation mark
<	less than
(	left parenthesis
>	greater than
)	right parenthesis

Special Education System* An E.P.I. Retrieval System that can locate over 5,000 educational materials from various publishers. Facilitates more accurate ordering and cost projections. Four disks cover motor skills, perceptual skills, readiness, and beginning level of all basic skills. Includes Teachers' Manual. Learning Well.

Special Effects* A well-documented graphics package that has many extra features to make your pictures even more special. Intricate shading is made possible by 108 colors and different brush sizes. Features image reduction, mirror images, color reverses, and picture flips. Also includes font converter so that you can use fonts with the CGS character generator. Paddles or joystick; tablet or hi-pad. 48K. Penguin Software.

Special Needs Volume 2* A special education package for motor-impared students in grades two to six. It consists of two simulations and three drill programs, useful for individual or group instruction. Includes programs for basic arithmetic functions, making correct change, and musical pitch. The simulation program demonstrates food chains in lakes and forests. 32K. Minnesota Educational Computer Consortium.

Specsystem* Three-dimensional hi-res graphic representation of spectral surfaces. Using an Apple hi-res screen, Eventide Spectrum Analyzer, and this software package, studies of acoustic impressions at a given time and space are available. There is a variety of representations that can be displayed and studied. 48K RAM; Integer BASIC; TV or monitor (color recommended). Eventide Clockworks, Inc.

Speech Synthesizer* A speech synthesizer with 250 words; by combining syllables, you can make hundreds more. This board comes with extensive documentation, and a program for outputting speech. John Bell Engineering, Inc.

SPEED BASIC Command. Determines the rate at which characters are sent to the screen or another peripheral I/O device. The format is:

SPEED = <n>

where <n> is an integer from 0 to 255; n = 0 is the slowest speed; n = 255 is the fastest and is the default rate.

Speed Facts* Speed and accuracy in mathematics are improved. Various levels of difficulty are available for students from the first through fifth grades. 16K. Ideatech Company.

Speed Reader* This program includes five separate reading programs that improve perception and eye span, teaches correct eye movement, and measures speed and comprehension. The program provides thirty-four interesting reading selections, and quizzes to check comprehension. It is a ten-lesson course to build and maintain reading skills. The Speed Reader was designed by a reading specialist and has undergone thousands of hours of testing. Davidson & Associates.

Speed Reader* A comprehensive reading development course designed for convenient practice sessions of thirty minutes each day. The exercises are interesting, cover a wide range of topics, and are divided into ten levels of difficulty. Each lesson contains a warm-up session to develop use of peripheral vision to increase reading speed and efficiency. There are eye movement lessons, column reading lessons, and reading passage lessons, as well as quizzes to measure your reading speed, test your comprehension, and evaluate your progress. Written in Applesoft. Apple Computer, Inc.

Speed Star* A compiler (q.v.) for Applesoft programs with an excellent manual explaining both the theory and operation of compilers. The disk can be backed up with any copy program, such as CopyA. However the program requires a DataKey (a chip which fits into the I/O Game Port) to operate, although it is not required to run already-compiled programs. The manual also includes a section on advanced techniques. Southwestern Data Systems.

Speed Stat* For the busy professional who needs quick and accurate statistical analysis of any type of research data—engineering, business, political, etc. Has a capacity of more than 10,000 points and over thirty statistical formulas. 48K. Softcorp International.

Speed-DS* Speed the execution of Applesoft programs from five to twenty percent. Also contains Machine language routines to speed string handling. Decision Systems.

Spelling Bee* A spelling program that teaches early elementary school students words of one to two syllables. Twenty lessons display pictures with objects that must be spelled out. A tutorial and drill mode are available to the instructor who has access to the learning management system. Includes hi-res graphics. 48K. Edu-Ware Services, Inc.

Spelling Bee With Reading Primer* Teaches three to six year-olds how to read and write with accuracy. Eduware Services.

Spelling Builder* A program of eight spelling tutorials for high school students. Features syllables, consonants, suffixes, plurals, and spelling. 16K. Program Design, Inc.

Spelling Check Software See Apple Speller, The; EasySpeller; Dic-Tio-Nary II; Goodspell.

Spelling of File Names Use of CATALOG. It may be useful to list all files on a diskette to find a program (if you are unsure of the exact spelling of its name). If you still cannot identify your program after using CATALOG to list programs of all diskettes, you may have to load and list the most likely-looking candidates until you find it. This points out the usefulness of program and file names that remind you of their purposes (mnemonic names), and of a REM at the start of each program to make it easy to identify them when listed.

If you are in BASIC (prompt is]), for the default diskette drive, enter:

```
CATALOG
```

For diskette drive #2, enter:

```
CATALOG, D2
```

See CATALOG.

Spelling Programs See Dictionary, The; EasySpeller; Spelling II; Spellstar; and Word Grinder.

Spelling II* A six-program package that teaches primary grade students the correct spellings of sixty troublesome words. While viewing a fill-in-the-blank sentence on the screen, the student listens to the word which must then be spelled into the space. Mentor Software, Inc.

Spellstar* A spelling dictionary program that processes text files, sorts words to another file, merges the sorted list with the dictionary, and checks for matches, then notes any misspelled entries. CP/M; Z-80 card; tow disk drives. MicroPro International.

Spiel* A quiz program in which you must answer a question in German, using a word that is the antonym of the correct answer. For example: if the answer to the question is "hot," you must answer "cold." Tape 'n Text—Williamsville Pub.

Spikes Sharp, temporary increases in a signal or voltage.

Spinwriter* A line of thimble printers manufactured by Nippon Electric Corporation (NEC).

Split Dollar* Both a company and its employees can benefit from this program that figures out whole life insurance coverage for workers. Premium payment, dividends and cash values are among the areas covered by this package. RE/International Systems Corp.

Split Screen Division of a CRT screen into two or more separate areas, or windows, in which distinct information is displayed.

Spool Simultaneous Peripheral Operating On-Line. A method of increasing system throughput by allowing programs using slow output devices to complete execution rapidly. Program output data is placed in queues on high-speed mass storage devices, or a part of main memory dedicated to spooling for low-speed transmission concurrent with normal system operation.

Spreadsheet Software See CalcStar; MagiCalc; Profit Plan; Senior Analyst; SuperCalc; Universal Business Machine; VisiCalc Commands Teacher; VisiCalc Programming Teacher; VisiCalc 3.3; VisiSchedule.

SPST Single Pole Single Throw. A type of switch.

SQR BASIC Statement. Returns the square root of <x>. The format is:

```
<v>=SQR(<x>)
```

Square Root BASIC. See SQR.

SR Status Register. A register holding bits that indicate the type of results obtained by the last operation, such as positive or negative, error or overflow situations.

SS Solid State.

SSD Solid State Disk Emulator* You can simulate a dual disk drive that will run about one thousand times quicker than a mechanical drive without all the troubles of a mechanical drive. This board plugs into any one of the seven slots on your Apple computer and requires no external power supply. Apple DOS 3.3, Pascal, and CP/M are supported. Synetex Industries.

SSDA Synchronous Serial Data Adaptor. A synchronous serial interface.

SSI Small Scale Integration. A technology holding a few gates per element.

SSR Solid State Relay.

Stacey's Math Series* The four basic arithmetic functions are taught to first and second graders with this two-program teacher's aid. 16K. Homeware.

Stack A LIFO structure which preserves the chronological ordering of information and is necessary for subroutines and interrupt management. A stack is manipulated by two BASIC instructions: PUSH and POP.

Stack Pointer The register in the CPU which contains the address of the top of the stack in memory.

Stamp Collector, The* A management package for stamp collectors that includes six programs: Foreign Stamp List, Domestic, Meeting List, Sources List, Database, and File Transfer. Andent.

Stand-Alone A device that operates by itself, requiring no other equipment.

Star Maze* An arcade-style game that uses the Apple computer's high resolution graphics capability and some really fast animation. It can be run on an Apple II or Apple II+ computer with 48K of RAM and one DOS 3.3 disk drive. It runs on the Apple III computer (in the emulation mode) and also runs on the Apple IIe. The player pilots a spaceship through a maze by using a joystick, paddle controllers, an Atari joystick, or the keyboard. When the game is booted, the player selects one of these means of playing. If the player gets his speed up too high, he will loose control and plummet through the maze until he collides with a meteor, a UFO, a scout ship, a saucer, a bug train, or a space station. All of these collisions are fatal. Running out of fuel or being shot by a saucer (or another enemy) are also fatal. The object of the game is to gather nine power jewels per level of play. You may pick up a power jewel only by driving the your spaceship over one at a speed of 200 or less. Enemies are killed by shooting them with bullets or by dropping an explosive bomb on them. There are sixteen levels of play. This game is a most challenging maze duel. Sir-Tech Software, Inc.

Starblaster* An arcade-style game where the player navigates and blasts his spaceship through six different obstacles: mines, invaders, comets, a fire field, and guardians. Action is fast; the player's spaceship can be controlled with paddles or a joystick. Selecting of mode of play is accomplished by pressing the M key after the program has been booted and the menu is displayed. The player has three chances to beat the bad guys. There are eight increasingly difficult levels of play. Sound can be toggled on or off by using the CTRL-S key combination. Play can be frozen by pressing the ESCape key. Piccadilly Software.

Start or Execute To cause a program or batch file to start functioning or to "run." See RUN.

Any diskette set up in "turnkey" format contains a file which is executed automatically by DOS when the Apple is turned on or rebooted. This file contains the command to start a program running, so that the program starts up automatically.

Start Bit A bit indicating the beginning of asynchronous serial transmission. See Stop Bit.

Start Up DOS See Reboot DOS.

Starting a New Program See NEW.

Starting Up DOS The DOS image (see Track Organization—Diskette) must be on the diskette in the default drive for booting or rebooting to work. The DOS image will be loaded into memory when the system is turned on (Apple II+ or IIe), or when you type PR#6 (Apple II/II+, IIe); then the program installed at the time the diskette was initialized (q.v.) will be executed. See Reboot DOS.

With the Apple III, the SOS must be loaded explicitly; the boot only performs the initial diagnostics.

STAT A CP/M command which displays the status of disk space, files, and devices. To display the available space on a disk, the user enters the following:

```
STAT
```

followed by RETURN. To display the types of devices assigned to device names, the user enters the following:

```
STAT VAL
```

followed by RETURN. To display which devices are currently assigned in the system configuration, the user enters the following:

```
STAT DEV
```

followed by RETURN. STAT may also be used to change devices assigned to the system. STAT can be used to display the size of a particular file by entering the following:

```
STAT <drive letter>:<file name>
```

STAT is used to list and describe all of the files of a specific type (as identified by an extension on a particular disk) by entering the following:

```
STAT <drive letter>:*.<extension>
```

STAT is used to list all of the files on a particular disk and to describe these files, by entering the follow-

ing after the drive letter shown with the prompt:
STAT*.*

Stat Trak* This well documented, engineering-oriented program can display the output in either table format or a black and white hi-res world map. 32K. Quality Software.

State Table A list of the outputs of a logic circuit based on the inputs and the previous outputs. Such a circuit has memory and cannot be described by a simple truth table. Also called state-transition table.

Statement A string of characters which is a syntactically complete instruction with respect to a high-level language translator.

Static Memory MOS memory which uses a flip-flop as a storage element. It does not need to be refreshed and does not require a clock. Furthermore, it does not lose its contents as long as power is supplied.

Static RAM RAM memory circuits which retain their contents as long as power is supplied.

Station Master* A universal parallel card that can dump a hi-res screen onto paper using basic keyboard commands. Includes options for various other tasks and comes with a printer cable. Computer Stations, Inc.

Statistical Analysis* A menu-driven program that plots frequency distribution of data sets, determines standard deviation and means, and performs linear regression. Spectrum Software.

Statistical Software See AIDA: Apple Interactive Data Analysis; Anova; Biobits VIII: Analytics; Conduit; Descriptive Statistics; Discounted Cash Flow Analysis; E-Z Graf; Forecaster II, The; Formula Reader; Fourier Analyzer; Freqout; Function Grapher; Function Plotter; Functions; Furnace (Domestic) Design; Innovative Program Associates; Relationship Package; Score: The Academic Assistant; Secondary Package; Sine and Cosine Grapher; Software Pac #1; Software Pac #3; Solving Linear Equations; Solving Simultaneous Linear Systems; Speed Stat; Statistical Analysis; Statistics; Statistics (Bio) II; Statistics Pac; Statistics with Daisy; Statpro; Stats; Stepwise Multiple Regression; SuperCalc; What's The Score? See Statistics Software Packages.

Statistics* A useful program that covers common statistical calculations such as mean, variance, frequency, standard deviation, and normal distribution probability. 32K with ROM card, 48K without. Edu-Ware Services, Inc.

Statistics* A program for students. Uses data from a student-gathered, 100 trial histrogram and, after plotting, the computer uses the data to extrapolate 500 more trials, giving the student a 600 trial base for analysis. Edutech, Inc.

Statistics (Bio) II* For the professional or student in biology or social sciences who needs graphic data representation. This program shows on screen: data plotting, curvilinear regressions, linear regression, and exponential regression. Hard copy of CRT graphs are possible through the use of a Watanabe WX4671 plotter with Takahasi interface. 48K. A2 Devices.

Statistics (Bio) II* A program that performs analysis of data and generates graphical representations for students and research workers in the biological and social sciences. The package performs the following test: data plotting, curvilinear regression, exponential regression, and linear regression. Inludes data editing and storage facilities. A2 Devices.

Statistics Pac* A database system that features programs for probability, statistics, and curve fitting. Distributions include normal, chi-square, poisson, binomial, and student-t distribution. Elements include analysis of combinations, permutations, and factorials. Hi-res plotting. Creative Discount Software.

Statistics Software Package* A variety of statistics software is available to the Apple user, ranging from simple introductory programs to complex formulas for engineering and scientific applications. Programs listed below perform various analytical and comparative calculations, saving the user valuable time and effort in problem solving. Contact the vendor for specific information regarding program performance and formulas.

Program	Vendor
Anova II	Human Systems Dynamics
Apple Statistics	Apple Computer, Inc.
A-Stat 79	Rosen Grandon Associates
Data Plotting Software for Micros	Kern Publications
Descriptive Statistics	Conduit
Exploratory Data Analysis	Conduit
French Curve	CET Research Group Ltd
HSD ANOVA	Human Systems Dynamics
HSD Regress	Human Systems Dynamics
HSD STATS	Human Systems Dynamics
Introstat	Ideal Systems
Introduction to Psychological Statistics	COM Press

Linear Programming	MPA Enterprises
MDCStat 2.0	MDC/Micro Data Collection, Inc.
Micro TSP	Micro TSP
Micro TSP Version 3.1	Micro TSP
NLLSQ	CET Research Group Ltd
Omnitrend	Educational Computing Systems
Stat (Statistics Applications for Technicians)	Matrix Software
Statpro (Mainframe Statistics on an Apple)	Blue Lakes Ltd
Stats Plus (VisiCalc Compatible Statistics Package)	Human Systems Dynamics

Statistics With Daisy* A variety of statistical formulas are available on this disk, including correlations, multiple regression, time-series transforms, mean, variance, and standard deviation. The package includes INFO and HELP for assisting the user with problems. Program commands include saving, examine, enter, and overlay data. 48K. Rainbow Computing.

Statpro (Mainframe Statistics on an Apple)* To be used by the professional researcher looking for the following features: data transformations, mailing label database, questionaire database, corvus compatibility, cross-tabulation ability, and sample data. Offers color graphics, multiple plots per screen, and a choice of symbols and lines. Blue Lakes Computing.

Stats* A program that can analyze eight samples of 250, do data transformations, chi-square, scattergram, linear regression, data file creation, and three T-tests. Human Systems Dynamics.

Status The present condition of a device, usually indicated by flag flip-flops in special registers. See Flag.

Status Bit Handshaking The delegation of certain bits of a parallel I/O port to coordinate information transfer with a peripheral device. Status bits are used to indicate device read, buffer full, printer out of paper, etc.

Status Register A register used to hold status information inside a functional unit, such as an MPU, a PIC, a DMAC, or an FDC. A typical MPU status register provides carry, overflow, sign (negative), zero, and interrupt. It can also include parity, enable, and mask.

STB-80, 80-Column Video Card* Many features are offered with this 80-column card, including upper and lower case, line graphics, scrolling, twenty-four lines of characters, low power consumption, keyboard entry of special characters, and more. STB Systems, Inc.

STD STanDard.

Stepper Motor A mechanical device which rotates by a fixed amount each time it is pulsed. Often used in diskette drives.

Stepwise Multiple Regression* An eleven-program package for performing a variety of multiple regression analyses. The fully linked system is based on the UCLA BIOMED system and includes mean, F-values, regression coefficients, standard deviation, and more. Because this menu-driven program is crosslinked between its component programs, you can create your system, prepare data disks and backups, update data, and perform the multiple regression analyses very easily. 48K. Apple Computer, Inc.

Stereo Generator, The* Create, edit, and manipulate 3-D illustrations. A maximum of sixty-five points in space with up to 170 line connections may be used to create images. These hi-res characters may be rotated 360 degrees upon command. An ideal program for scientists, engineers, and architects. R-Alpha Software.

Stock Control System* Maintains a stock file and a daybook file; records orders placed with suppliers and orders placed by customers; minimum stock, reorder, and free stock levels; calculates gross profits, turnover rates, and value of stock at hand. All information is screen-accessible. Padmede Computer Services.

Stock Forecasting System* Generates buy, sell, cover, and sell short recommendations for each of your stocks based on technical analyses performed by the program. The user enters extensive historical performance records as keyboard input or graphed data, and current price information can be input manually or via an on-line information service. This system of fifteen interlocking programs features ease of use and good error handling. Optional updates are available at an extra cost. Urban Aggregates, Inc.

Stock Maker* A business program that gives manufacturers a complete bill of materials for manufacturing. The program sets up product inventory, lists of assemblies for products, and generates reports of stock on hand. Simply stated, you can go from an order for finished products and the inventory parts list, to an updated inventory list including the products you have just produced, minus the materials used in the production process. 48K. Requires Stockfile* (an inventory database). Solidus International Corp.

Stock Market Packages A large number of programs are available that perform stock charting and analysis, organize portfolios, gather market information, and record business transactions. The list below contains a selection of these packages. Please contact the vendor for further information.

Program	Vendor
Bond Manager,The	Analytical Service Associates
Broker, The	Computer Consultants of IA, Ltd.
Commodities Transactions	Professional Computer Systems
Compleat Computing Investor, The	Microcomputing Research
Computer Stocks & Bonds	Avalon Hill Game Co.
Convertible Bond Analyst, The	Analytical Service Associates
Dow Jones Market Analyzer	Dow Jones Information Services
Dow Jones Series Portfolio Evaluator	Dow Jones Information Services
Forecast I	Jaylet Company
Forecast II	Jaylet Company
Investor's Aide, The	Microcomputing Research
Market Maverick	Financial Software Inc.
N2 Market Illustrator	N-Squared Computing
N2 Stock Analyzer	N-Squared Computing
O.A.SYS (Optional Analysis System)	Software Resources, Inc.
Option X	Crawford Data Systems
Personal Investor, The	PBL Corp.
Small Investor's Sampler	Microcomputing Research
Stock Forecasting System	Urban Aggregates, Inc.
Stock Manager, The	Analytical Service Associates
Stock Market	Rocky Mountain Software
Stock Option Analysis Program (SOAP)	H & H Scientific
Stock Portfolio System, 2nd Edition	Smith Micro Software
Stock & Options Analysis	Sensational Software
Stockmgr	Micro Associates, Inc.
Stockplot	Warner Computer Systems, Inc.
Technical Investor, The	Microcomputing Research
Techni-Trac	Guardian Software
Trader Doc	Rainbow Marketing
Weekend Investor, The	Microcomputing Research
$2 Broker—Client Unlimited	Broker Soft, Inc.
$2 Broker—Client 100 Plus, The	Broker Soft, Inc.

Stock Market Software See ANAI; Analysis 1; Annual Report Analyzer; Apple Portfolio Evaluator; Computerized Stock Market Analysis; Computing Investor, The; Compu-Trac; Creative Financing; Cyber-Tech Stock Valuation Program; Discounted Cash Flow Analysis; Dow Jones Portfolio Evaluator; Download-MA; EASI/ARIMA; Investment Data System; Market Advisor; Market Charter; Market Tracker; Moneybee I and IX; On-Balance Volume Charting; Smart Analyst and Graphics Package, The; SOAP (Stock Option Analysis); Stock Control System; Soybean Harvest Losses; Stock Forecasting System; Stock Option Valuation; Stock Options; Stock Portfolio; Stock Portfolio Program; Stock Tracker; Stock Valuation Program. See Stock Market Packages.

Stock Option Valuation* The user can interact with this easy-to-use program to obtain the fair market values for stock warrants, put options, and call options. Call options are evaluated using the "Merton Model," and put options are calculated using a modified version. It takes less than two seconds to perform each simultaneous pair of options for evaluations once the user inputs the required price, volatility, dividend yield, market interest rate, and the exercise price of the options. The Organization for Econometric Research.

Stock Options* The program determines the theoetical cost of any call option using the Black-Scholes forecasting model. United Software of America.

Stock Portfolio* Ease of storing and retrieving data is an important feature of this program, that will analyze and record the historical prices of your portfolio or individual stock. Howard Software Services.

Stock Portfolio Program* An aid for managing investment portfolios. Includes a file management system to handle entry and update of investment descriptions and pertinent information, and a reporting system to develop value studies by various criteria. There are functions to analyze gains and losses, average prices, and current market values of individual stocks or the entire portfolio. Applesoft; two disk drives; 80-column printer. Charles Mann & Associates.

Stock Seller* A very complete point-of-sales system that generates invoices, tracks accounts receivables, updates inventory, and includes a sales analysis section. Other features include the ability to print lables, classify products, and categorize products. A helpful manual is included. 64K. Requires Stockfile* (an inventory database). Solidus International Corp.

Stock Tracker* Stores files and data in tabular form and computes buy, sell, and hold recommendations for stocks, options, and commodities using the Howard's volume force model. Data is input from the keyboard and may be output to the screen or printer in tabular or graphic formats. H & H Trading.

Stock Valuation Program* Based on a model developed by a successful West Coast bank, this program analyzes dividends, growth rates, internal rate of return, payout ratios, earnings, and other investment evaluation techniques. Disk or cassette. Cyber-Tech.

Stockfile* A stock maintenance program that has the capacity for many items and can access any item in less than two seconds. This database program is designed for people who have little knowledge about computers. It is menu-driven, well documented, and lets you know when items were sold or bought, how much they cost, and how much they are worth. You can request calculation, figure out your inventory's total value, and get reports according to user-defined categories. This package includes the following reports: 1) data creation error listing; 2) inventory transfers audio listing; 3) inventory turnover; 4) price book; 5) inventory update audit listing; 6) physical inventory checklist; 7) shortages report; 8) master listing. Reports, except for audit and error listing, can be changed, and new reports can be created. Each part is defined by twelve categories. A sample inventory is included so that the user can see how a system operates. Password protection is provided, therefore prices, stock totals, and other information cannot be altered. Compatible with the Stock Maker* and Stock Seller* programs, also by Solidus. 48K. Solidus International Corp.

Stockroom* An inventory program and purchasing tool to promote stockroom efficiency. Keep track of your stock, its costs, selling price, and vendors. Searches files for item number, item description, estimates stock levels, and determines order points. Monument Computer Service.

Stoichiometry: General* Problems dealing with mass/mass, mass/volume, and volume/volume relations in chemical reactions. Microphys Programs.

Stoichiometry: Mass/Mass* A series of questions dealing with mass/mass relations in chemical reactions. Microphys Programs.

Stoichiometry: Mass/Volume* A series of questions involving mass/volume relations in chemical reactions. Microphys Programs.

Stoichiometry Volume/Volume* A series of questions on volume/volume relations in chemical reactions. Microphys Programs.

STOP BASIC Statement. Terminates program execution and returns to command level. The format is:

```
STOP
```

You may use STOP statements anywhere in a program to stop execution. When BASIC sees a STOP statement, it displays the message:

```
Break in xxxxx
```

where (xxxxx) is the line number where the STOP occurred.

STOP statements do not close files, as do END statements. BASIC will always return you to command level following execution of a STOP statement. By using the CONT command, you can resume execution of the program. See CONT.

Stop and Terminate Current Function To end, terminate, or break current function in any program, press CTRL-C (both keys together); the program will stop when execution of the line currently being processed has been completed. To cause an immediate stop, you must press CTRL-RESET. See Reboot DOS.

Stop BASIC program see STOP and END.

Stop Bit A bit indicating the end of asynchronous serial transmission.

Stop the Screen During a LISTing of a BASIC program, pressing CTRL-S (both keys together) will cause the LISTing to pause; pressing any key will resume the scrolling of the LIST. This same key combination will cause some programs to pause in their execution, but by no means will all programs respond in this manner.

Storage Synonym for memory (q.v.).

STORE BASIC Command. Records an array from memory to cassette tape. The subscripts are not indicated, but the elements of the array are stored in order.

Store Manager, The* Assists the small store owner in management of inventory and tracking of cumulative sales. The program will also print various invoices, quotations, orders, and slips. Keeps current lists of over 1,000 customers and vendors. 48K; 80-column printer; serial or parallel printer interface or SSM/AIO board. High Technology, Inc.

Straight Line* A flight program, also known as the Great Circle Route, lets you fly all or part of your trip on the Great Circle Route, or you can plan a flight between VORs, or a combination of the two. You can enter the route you choose. Printout capacity lets you take computed data such as fuel consumption and distances between destinations. Flight Opps.

Strain Gauge A sensor which produces a voltage or resistance change when a force is applied.

Strategies for Test Taking* Looks at major kinds of tests and offers general information that prepares the user for a test. It suggests certain techniques that have proved to be successful and provides multiple-choice, true-false, fill-in-the-blank, and essay-type questions so that you can practice. Mesa Research.

String An ordered sequence of data items, such as characters. For example, the word "string" is a string of six characters. See Character String.

String, Convert from a Number BASIC. See STR$.

String, Convert to a Number BASIC. See VAL.

String, Numeric Value of BASIC. See VAL.

String, Right Justify BASIC. To print the string variable (e.g., A$) relative to its right end, use the following format:

```
nnn PRINT TAB(n -LEN (A$)) A$
```

where nnn is the line number, n is the width of the screen (40 for Apple II/II+ and some Apple IIes; 80 for most Apple IIes and IIIs).

This will cause the string to be printed at the right edge of the screen. If you wish to have some (x) spaces after the string on the right, then modify the TAB argument to [n-x-LEN(A$)]. If you wish to print on the next line of the screen after a full right justified string, you should place a semicolon after the string variable name, viz:

```
nnn PRINT TAB[n -LEN(A$)] A
```

String Handling The ability of a programming language to operate on strings of characters.

String Length Apple III Business BASIC allows from 0 to 255 characters per string. Applesoft and Integer BASIC also allow the same string length. See LEN.

String Spec Apple III Business BASIC uses a PRINT USING statement which refers to a line containing a string spec statement to format string output to a file, the console, or a block storage device. The string spec sets up the format of string output, its width, and the justification of the string in the field. Left justification is specified by the letter A; center justification is specified by the letter C; right justification by the letter R. The IMAGE command is used to format strings. If the string which is actually used exceeds the string length in the IMAGE statement, this string is truncated when it is output. An example is provided below:

```
125 IMAGE 10A, 10C, 10 R
130 PRINT
135 PRINT USING 125;"BRIGHT EYES, BRIGHT,
EYES"
140 PRINT
```

The output from this example would be as follows when it is RUN:

```
BRIGHT EYE         BRIGHT                 EYES
```

Truncating has occurred with the first string and it is left justified. The second string is centered. The third string is right justified.

String Variable Rules for names in BASIC. See Names.

Strobe A selection signal that is active when data is correct on a bus.

Strobe Model 100 (Drum-Type Plotter)* A hi-res plotter that accepts many different pens, has an interactive digitizing mode, is easy to use, and permits the X-Y coordinate data corresponding to pen position to be entered directly in to the computer. Other features include variable character sizes, vector plotting, horizontal and vertical character strings, and axis generation. The operator control includes Pen Lift control, ENTER/START command switch, and two-speed positioning in the four directions of motion. Strobe, Inc.

Strobe Plot* A hi-res graphics program that links your computer to a plotter (Strobe Model 100*). You will be able to create a data file, an option file, or plot a file. Each file may consist of eight lines with 100 points per line. Strobe, Inc.

Structured BASIC* Eleven new BASIC statements, fourteen new commands, and the PBASIC-DS preprocessor give you structured-program power. Decision Systems.

Structured Language A computer language designed to aid or enforce structured programming. Control structures such as IF..,THEN, ELSE, DO, WHILE, CASE and REPEAT, UNTIL, together with provisions for declaring logically separate program modules (such as procedures), and limiting the scope of variables all lend a modular structure to programs. Unconditional control transfer statements (GOTOs) are often left unimplemented. Popular structured languages are Pascal, ALGOL, and C programming languages.

Structured Programming A set of techniques designed to increase the reliability and comprehensibility of programs by increasing programmer discipline. Structured programming involves precise problem specification, top-down or stepwise program design, and block-structured or modular programs.

STR$ BASIC Function. Returns a string representation of the numeric value in <x>. The format is:

<v>$ = STR$(<x>)

<x> is any numeric expression.

When <x> is positive, the string returned by STR$ contains a leading blank (the space reserved for the plus sign).

Student Payroll* Colleges can now know exactly how much money they have to allocate to work study programs. Wages, hours worked, and the total number of students using the work study program serve as input to calculate future financial needs. 64K. Software Creations.

Study Quiz Files (SQF)* Choose any subject to create questions for later testing. Each file may be deleted, edited, saved, or revised. This is a very handy and powerful teacher's aid. Compu-Tations, Inc.

STX Start of TeXt.

Subdirectory Apple III DOS provides the user with a hierarchical file structure. This file structure refers to a disk as a "volume," the listing of file subdirectories (and of files not associated with subdirectories) as "directories," and the listing of files associated by the user as a specific class of files as a "subdirectory." See Pathnames for detailed descriptions and examples.

Sub-Harmonic A fractional multiple of the fundamental frequency.

Subject Data Tapes/Files* Accompanies the Individual Study Center activities and contains at least eighty questions. Teach Yourself by Computer (TYC) Software.

SUBMIT A CP/M .COM file which executes a series of program files. This command is used to batch process a list of command lines in a CP/M text file.

Subroutine A program segment ending in a "return" statement. Execution is transferred to a subroutine when a subroutine call occurs. Subroutines improve program modularity and save memory space at a minimal cost in the overhead required to process the call/return sequence.

Passing parameters (also called arguments or data) makes information from one process or program available to another process or program. This is similar to a football pass, except that one or more bytes of data replaces the football and the receiver is a program. The sender may be a program or a person typing the data onto a command line to be "passed" to a program. The two most common examples would be DOS passing parameters from the command line to a program and a BASIC program passing variables to a subroutine.

Subroutine BASIC. See GOSUB and RETURN.

Subroutine, Machine Language from BASIC See CALL and Ampersand (&).

Subroutine, Machine Language from BASIC—Defining Start Address See USR.

Subscript The reference to a particular element of an array. If an array consists of fifteen individual elements, the array will have the name, AR for example, and each element will be referred to by both the name and a subscript, e.g., AR(0), AR(1), AR(2)....etc. AR is the name, and 0, 1, 2, etc. are the subscripts. Arrays in the Apple have as their first element the name plus the subscript zero. All arrays with greater than eleven elements (subscripts 0 through 10) must be DIMensioned before use. See Arrays and DIM.

Substring A portion of a string variable or a string literal. For the string "APPLESOFT", there are many substrings, such as "APPLE", "SOFT", "APP", etc. See LEFT$, MID$, and RIGHT$.

Successful Job Interviewing* Get that job! This program covers topics such as appropriate dress, the importance of arriving on time, correct behavior and attitude, and directions the interview may take. MCE, Inc.

Succession* An arcade-style maze game where your piece pursues numbered creatures within a two-dimensional maze. The object of the game is to capture or consume all of the numbered characters before your piece is consumed by another creature. There are three levels to the game. Each level is progressively harder than the previous one. Your piece is controlled by keys on the keyboard which you designate as the up, down, left, and right keys at the beginning of the game. Action is fast and the maze changes constantly, as doors open and close at random in the maze. This game can be played on the Apple II, Apple II+, Apple IIe, and Apple III in emulation mode. Piccadilly Software, Inc.

Sukkot* Designed to educate you about the basic laws and traditions of the Sukkot. After completion of the five sections, which cover concepts, holidays, etc., you are asked to complete a test to evaluate your understanding of the material. 48K. Institute for Computers in Jewish Life.

Super Apple BASIC* A structured BASIC that compiles into optimized Applesoft or Integer BASIC. Hayden Book Company.

Super Bar and Wine Guide* Will help you choose your vintage pleasure from the bar. Cine-Aero Productions.

Super Checkbook III* Uses six data field formats to organize your monthly files. You can enter up to 1850 transactions into a data file, while using a search option to find unpaid checks. 48K. Powersoft.

Super Disk Copy 3.7* A utility package that permits manipulation of all types of disk files under DOS 3.1, 3.2, and 3.3. It can copy all but protected disks, including FORTRAN and Pascal disks. There are three copy modes: rearrangement of a fragmented disk into a contiguous target disk; a quick copy of only used sectors; and an entire disk copy. This utility will also copy individual files, or just DOS from one disk to another. Other features include: alphabetizing file names, removing DOS, undeleting a deleted file, correcting file sizes (if a new file with the same name as an old file is smaller and is saved), shortening the catalogue, and producing a map of the used sectors on a disk. DOS 3.2 files can be converted to DOS 3.3. 48K. Sensible Software.

Super Draw and Write* Contains eight styles and nine sizes of letters, Machine language scrolling, graphics with sound option, and draws just about anything. Avant-Garde Creations.

Super Expander Plus* This utility, which requires the Ramex-128 (q.v.) card, allows you to have a full 136K of memory for VisiCalc*. To take full advantage of this program, you need to initialize special diskettes, as Super Expander will save only one Expanded VisiCalc file to a disk. This is because the Super Expander utility differs from normal VisiCalc processing.

Super Expander Plus allows you a choice of a 40- or 80-column format for your VisiCalc files. The VisiCalc form will load with 136K of memory. New local commands allow you to have variable column widths (especially useful for label columns so that your labels may be entered without having to cross over two or more columns); to validate data type if the VisiCalc user is a novice; to hide and/or protect certain cells (use caution! Once a cell is hidden, it cannot be accessed without the proper password); and to use a tab function to move the cursor a predetermined distance. The new storage commands allow you to initialize the expanded format data diskettes; keep (rather than "save") a VisiCalc form as a binary file, which is necessary when working with large files, to take advantage of the increased speed available; to conserve memory with "garbage collection;" and to use the mount (rather than "load") command, to load the special binary files. Omega MicroWare, Inc.

Super Fan II* Add this low noise fan to your Apple and keep it running cooler. Available in 120 or 240 volt models. R.H. Electronics.

Super Input/Output Board* Use this board as a printer output port, a digital joystick port, burglar alarm control, and more. Eight buffered outputs to a standard sixteen-pin socket use standard dip ribbon cable connections. Inputs can be high-speed logic to simple switches. Eight inputs can be driven from TTL Logic or any 5-volt source. Includes a detailed schematic. Applied Engineering.

Super KRAM* Allows simultaneous access to a KRAM file by more than one key field. Features high-speed read, integrated BASIC commands, improved index architecture, user-specifiable buffer pool, and logical records. KRAM 2.0 files are compatible with SuperKRAM. United Software of America.

Super Math Package* A nineteen-part program covering areas such as arithmetic functions, binomial multiplication, eccentricity form of conic, graphic integration theory, limits of sequences, orbiting and rotating figures, rational function grapher, sine and cosine grapher, solving linear equations, and more. Math Software.

Super Message* A message-making program. The text is printed in big, bold, colorful characters. 48K. Connecticut Information Systems.

Super Music Synthesizer* Use the manual to start writing your own music immediately with this sixteen-voice music synthesizer. It is easy to connect: plug the board into your computer, hook up the cable (which is included) to your stereo, boot the disk (included), and start composing. This is a sophisticated music system that lets you play, compose, or just run the music already supplied on disk. True discrete quad sound or stereo is utilized. A great hardware/software package that will provide you with hours of fun and entertainment while you're learning about music. Applied Engineering.

Super Pix Software* The user can dump hi-res graphics from Apple to Okidata or Epson printers with this utility. Transfers are made in several sizes, orientations, and normal or inverse modes. Self-documenting. Micro-Ware Distributing, Inc.

Super RAM II* This board which plugs into Slot 0 of the Apple computer, will expand your 48K Apple to a 64K Apple. It includes selectable dip switches, five RAM-ROM options, and more. R.H. Electronics.

Super Shape Animate* Two kinds of animation are offered in this flexible program: one where you create a shape, erase it and recreate it further on to demonstrate the illusion of motion and a more difficult one where you can show how a person walks or a horse gallops. There are also programs in which you start drawing one shape and change only one part to create additional shapes. 48K. Avant-Garde Creations.

Super Shape Draw* A drawing program that gives you edit features, erase features, address option, shape-view program, continue feature, and perfect keyboard command. Avant-Garde Creations.

Super Sketch* A keyboard-controlled graphics program. Enables characters to be colored, merged, moved, or saved. These creations may be of various sizes and can be used to develop slide shows. 48K. Jay Rosenberg.

Super Sort* Sorts text, index, and random files. The sorted output file can be displayed on the monitor and can be written to the same or a different disk (designed for a single drive system). A.B. Buscaglia.

Super Sort & Search* A free-form database package. The user can define fields per record, and data is automatically sorted as it is loaded. Specified data searches or generic searches are possible. Also, files can be merged. Progressive Software.

Super Sound* A Machine language program for producing complex sounds and music which can be accessed from any Integer or Applesoft BASIC program. You can use Super Sound's built-in sounds or create your own. Includes complete documentation and a demonstration Applesoft program. Rainbow Computing.

SuperCalc* Designed to give the layman the ability to manipulate business data throughout a variety of accounting and forecasting applications. Video scrolling allows access to an entire worksheet and menu-driven help commands make this system easy to install and use. RTR Software, Inc.

SuperCalc* Make decisions and answer questions quickly and easily. Numeric data can be edited, manipulated, and analyzed. Various speadsheets may be combined to produce reports. This is one of the original spreadsheet programs. It is time-proven, versatile, and is very similar to VisiCalc*. Both programs are easy to use but differ mainly in their command mnenomics. Sorcim Corp.

Superclock II* A battery operated clock for your Apple computer. It works with all Apple languages, has up to four software control interrupts, and full time/calendar display (month, day, year, time of day). West Side Electronics.

Superedit* A full-screen editor with single keystroke commands. Performs all the typical editing functions by line, page, or block. Search and replace and macro capabilities. Microcraft Systems, Inc.

SuperFORTH* The flexibility of predefined and user-defined functions is at your disposal with this high-level, stack-oriented language. Build a library of new commands and call them for use by name. Some of the features of SuperFORTH are: immediate and compile operation modes, independent integer and floating point stacks, Apple hi-res graphics, and over 150 predefined commands. Hayden Book Company.

Superfox* A sales journal and inventory control program, designed with the help of California mobile home dealers to aid other mobile home dealers with their transactions. You can examine totals for taxes, commissions, fees, and profits. Stock can be listed by serial number, type, and location. When you close a sale, you will be assisted by a function that computes monthly payments, true APR, total interest, and total principal. There is also a figure that lets you roll the down payments, interest rates, trade-ins, and prices and adjusts payback terms to accomodate the budget of your buyer. This program also lets you pick up the odd days' interest beyond the thirty-day value (in your rate charts) up to the forty-five day limit of the first loan payment. West Coast Consultants.

Supermap* An educational program designed to teach U.S. geography. It presents four hi-res maps of the U.S. that show vegetation, states, January solar radiation level and July solar radiation level. It is possible to find 300 cities and determine distances between any of them. You can request statistics on any city requested such as population, zip code, area code, time zone, latitude and longitude. A state capital quiz is included. The graphics and execution of the programming are excellent. 48K. Apple Computer, Inc.

SuperPILOT* Teachers will find this to be a very useful and powerful aid. Colored and double-sized characters emphasize text and graphics. Apple Computer, Inc.

Superplot* Create graphs and charts in color graphics that can be displayed in various formats. Enhances the appearance of your work by adding labels and titles, changing format, and altering color and scaling. Microware Associates, Inc.

Superplotter, The* Allows the user to display curve graphs with text. Also allows for pie, bar, and mathematical graphs. Features edit, recall, and save options. Excellent for business, engineering, and educational applications. 48K. Dickens Data Systems, Inc.

Supersort (Rev. 1.5)* A program for data file manipulation that can sort, merge, and record selection functions on up to thirty-two files. It can be combined with other programs to create key index files, can perform file conversion functions, and print out records. 48K; Z-80 card. MicroPro International.

Supersound* For the novice sound programmer that wants to add Machine language subroutines to programs for sound enhancement. A demonstration disk contains twenty-six sounds. The calls to utilize these subroutines are also on the demo disk. 16K. Rainbow Computing.

Supertalker* A peripheral system that gives your computer human speech capabilities. The system consists of a microphone, a loudspeaker, operating software, documentation, the Supertalker peripheral card, and two ready-to-run programs. Mountain Computer, Inc.

Supertext 40-56-70* A versatile word processing program that includes most of the standard functions. The program can be used in three different column display modes, has user-designed character sets, offers Auto-Link that permits several files to be linked on multiple file disk drives, and is easy to learn. 48K; 80-column card; printer. Muse Software.

Support Chips All the components beyond the main device required for complete system operation.

Sup'R Fan* Keep your Apple cool by adding this noiseless fan. The fan has its own power supply so it draws no computer power. Mounts inside case. M & R Enterprises.

Sup'R Ledger* Accounting system package that can handle up to 200 separate accounts and 1400 transactions per time period. Produces the following reports: Working Trial Balance, Income Statement, Balance Sheet, Chart of Accounts, General Ledger, Journals, and Budget Income Statement. Easy closing of current period as well as offering extensive error checking and other features. Data Systems, Inc.

Sup'R Mod* The purpose of the Radio Frequency (RF) modulator is to convert (or modulate) the signals generated by the color card, which are correct for a monitor to the type required by a home TV set (Radio Frequency). Modulator. See Radio Frequency. M&R Enterprises.

Sup'R Mod II* This interface will convert a television into a full video monitor. Works on black and white or color. For computer systems which output NTSC compatible composite video. M & R Enterprises.

Sup'R Term* An 80-column card, which is compatible with most programs that support 80-column display. Switching to and from 80-column is accomplished either by a switch on the back of the computer or by software control. Upper and lower case shift is done by use of CTRL-A, which could be a problem if CTRL-A is a function of the program being used. M & R Enterprises.

Surge Protection Although the voltage which powers your computer is reasonably constant, there are occasions when there are momentary sharp fluctuations in this voltage. A spike or surge can cause damage to the integrated circuit (IC) chips in your computer; therefore, many people install a surge protector between the house power and the computer which damps the voltage spikes in fractions of a second.

Suspend Screen Output System control keys can be used by the Apple III console driver to carry out a number of direct functions. Screen output can be suspended (frozen) by using the CTRL key with the number 5 key on the computer's numeric keypad. This combination toggles the computer's screen output on and off.

SUT Socket Under Test.

SW Status Word.

SWAP An Apple III Business Basic command which is used to swap the value of one specified variable with the value of another specified value. The format is:

```
SWAP X,Y
```

X and Y are numeric variables.

For example:

```
100 X = 5 : T = 10 : Z = X/Y
200 PRINT "Z = "; Z
```

will display Z = .5.

however:

```
100 X = 5 : Y = 10 : SWAP X, Y : Z = X/Y 200
PRINT "Z = "; Z
```

will display Z = 2.

Swine Enterprise Analysis System* Part of the Enterprise Analysis System designed to operate with data previously input to the manufacturer's general ledger. Individually listed expense category records are maintained and summarized as total cost per saleable unit produced. Computerized Farm Information Systems, Inc.

Swine Management System (B.O.A.R.S.) A comprehensive and easy to use swine management system, available in several versions, to meet specific needs. Computerized Farm Information Systems, Inc.

Swine Ration Analysis* Analyzes your swine ration for calcium, protein, and phosphorous content, determining the proportion of needed nutrients-supplied in relation to the 1979 NRC swine nutrient requirements. AG-COM.

Switching Regulator A power supply design providing regulation by commuting the input voltage into a filter circuit.

SYBEX A leading publisher of computer books.

Symbol Table A table constructed by an Assembler or compiler to associate symbolic names with actual addresses or values.

Symbolic The use of characters or character strings in a defined syntax to stand for machine-related entities, such as instructions or data.

Symbols and Valences Drill* The students' knowledge of symbols and the valences of common ions and radicals are tested by this program. Microphys Programs.

SYNC Short for SYNchronous or SYNchronizing.

Synchronous Operation controlled by a mutually sensed clock pulse.

Synchronous System A system in which all events are synchronized with a common clock pulse.

Synergy-Card* Combines the functions of many cards into one, thus consuming less power and taking less slot-space. There are three different options (versions) available, but the normal function is as a 16K RAM card. The three options are: 1) Parallel Printer Port, Serial Port, Two Interval Timers and Software; 2) Clock/Calendar; and 3) BSR X-10 Ultrasonic Interface. Spies Laboratories.

Syntax The rules governing proper construction of statements in a language. For programs, the rules include spelling and placement of keywords; spelling and type of data names; and number, type, and order of arguments. Punctuation rules are also part of syntax.

Syntax—Programming Languages The set of grammatical rules defining valid constructs (sentences or statements) of a language.

Syntax Check A check, performed by a program or directly by a person, to ensure that one or more statements in a programming language complies with all syntax rules of the language. A program may pass all syntax checks and still give an error message or erroneous results due to logic, data, or program flow problems.

SYSGEN A CP/M program which is used to initialize diskettes, place the operating system on a diskette, and load and execute the system in the computer's memory. The versions of CP/M used by the Apple use DISKCOPY rather than SYSGEN to accomplish these tasks.

System Any aggregate of two or more interconnected electronic components. Also used for "computer system." See Computer System.

System Refers to a group of programs which accomplish some function (e.g., database management system), or a group of interconnected devices (e.g., turn the system off), or both taken together (e.g., a total accounting system).

System Clock On the Apple II/II+ and IIe the clock is an internal timing system for timing signals and is not accessible to the user. On the Apple III there is an internal clock, which is reset to zero when the machine is turned off, but can be made to operate continuously by connecting three AA batteries. This will keep track of date and time and record them on the screen in all programs which provide for this information.

The timing signals are as follows for the Apple II/II+:

Master Oscillator (all timing signals are derived from this signal): 14.318 MHz

Intermediate Timing Signal:7.159 MHz

Color Reference Frequency (used by the video generator circuitry):3.580 MHz

Phase 0 system clock: 1.023 MHzThese two signals compliment each other

Phase 1 system clock: 1.023 MHz

General purpose timing signal: 2.046 MHz, asymmetrical

System Configuration Program Error Messages The following error messages are displayed on the Apple III computer screen when an error is encountered during the operation of the System Configuration Program:

Error Message	Cause	Remedy
No device drivers have been read	Self-explanatory	Load device drivers to SOS.DRIVER file
Illegal wildcard	More than one used when only one is allowed or one was used when only one directory was on disk	Try it again
Invalid pathname	Illegal syntax used	Try it again
Pathname too long	More than eighty characters used	Try it again
File contents incorrect	Keyboard character set incorrect	Redefine character set
Slot number may not be altered for this driver	Driver works in only one slot	Use as indicated
Character set not loaded	Not configured for any character set	Use Edit Parameters to set up
Duplicate driver names	Two drivers have same name	Use Edit Driver Parameters to fix
Keyboard layout not loaded	Not configured for any keyboard layout	Use Edit System Parameters to fix
One or more drivers require slot assignment	No slot specified	Use Edit System Paramters to fix
System parameters are not set	No parameter set	Use Edit System Parameters to fix

These error messages are displayed in a special viewpoint at the top section of the computer's screen when the error is encountered and the computer sounds a whistle to attract attention.

System Diskette CP/M. Used to contain DOS commands (.COM files) and other system software or utility-type programs. COMMAND.COM and various other .COM files need to reside on only one diskette. Ordinarily, this will be the diskette in drive A, or other default drive, so the DOS commands can be specified without a drive letter. If you are using an electronic disk, that may well be the best place for your system software—and a good choice for default drive. A system diskette may also store user programs and/or data. See also Data Diskette.

System Failure—SOS If SOS fails completely during operation, the only remedy is to reboot. This failure is usually associated with a hardware or interpreter failure.

System Master Diskette Contains a number of useful program utilities and demonstration programs for the Apple computer. It is supplied when you purchase your system.

System Monitor See Monitor, System.

System Reset See Reboot DOS.

System Saver* A multifunction add-on device for your Apple. It includes a cooling fan to keep your machine cool, a line surge suppressor, and two switched power outlets. The System Saver's control switch controls itself, your Apple, and any devices plugged into it. Kensington Microwave, Ltd.

System Time See System Clock.

Systems Analyst* Learn BASIC programming with an easy-to-follow thirteen lesson program. Start with the fundamentals and progress to the more difficult commands. Monument Computer Service.

Systems Analyst Plus* This is a combination tutorial and reference guide. Seventeen tutorials on various aspects of Applesoft II and a reference system make up the package. Excellent for beginning and experience programmers. Monument Computer Service.

Systems Software A software package is a group of computer programs (including data files and documentation) that perform a function or group of related functions on the computer. These programs are called systems software packages when they facilitate the use of the machinery—such as a database management package, a disk operating system, or a program development package. Such programs are called applications software when the programs are devoted to an end user task—such as a word processing package, an accounting package, etc.

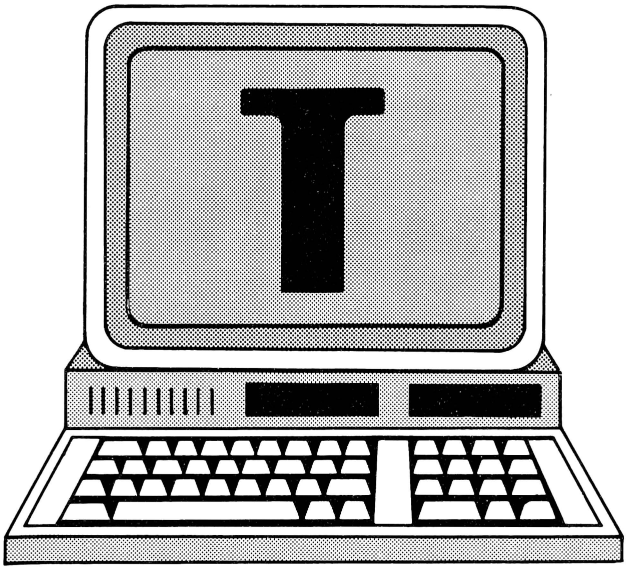
Systems II Accounts Recievable* An accounts receivable system that will coordinate with companion software or stand-alone to generate statements, aging reports, and a running invoice list. Hard or mini-floppy disk. Printer required. Westware Software, Inc.

Systems II EX* A complete accounting system containing many unique features. A KSAM firmware card allows faster access to records through key field search. It also provides portection against unauthorized intrusion. A full range of accounts and listings are available for updating and balancing checking. Some of the accounting features can be purchased separately or combined into one package. 132-column printer. Westware Software, Inc.

Systems II EX-Payroll* A menu-driven program that calculates and maintains payroll reports and employee information. It also generates year-end W-2 forms and checks with current and year-to-date stub reports. Handles miscellaneous deductions and a variety of pay schedules, has user-updatable tax tables, generates an audit trail, and has record password protection. Westware Software, Inc.

S3E Pack Module Library—Systems Flowsheet Analysis Manual* A companion program to the Thermopack Thermodynamic Properties system that conducts a tutorial on constructing flowsheet analysis programs. It will show the user how to configure its program modules for power plant simulation. Consists of fifteen program modules. Physical Science, Inc.

S-100 An extremely widespread 100-line microcomputer system bus. It was originally developed as the bus for the first 8080-based system, Altair. It has since been standardized as the IEEE 696 bus. In its latest form, it can be used with the newer 16-bit microprocessors.



T Codes. ASCII = 84, HEX = 54. t—ASCII = 116, HEX = 74.

T An electrical network shaped like the letter "T". It has one input, one output, and one ground lead. Used with resistors for attenuators and capacitors, and with inductors for filters. Also, True—a logical 1.

T Command Cursor The Apple III's console driver provides the user with a number of single keystroke commands which move the cursor or limit its movement. These commands are accessed by pressing the ESCape key. If the letter "T" is pressed after the ESCape key has been pressed, the upper left corner of the viewport is set to the cursor's current position on the screen. This produces a window in which the user can work while he refers to material displayed on another portion of the screen.

TAB BASIC Function. TAB tabulates to position <n>. The format is:

PRINT TAB(<n>)

<n> must be in the range 1 to 255.

If the current cursor position is beyond space <n>, the cursor will not move. Using 0 as the argument will result in the cursor being moved to position 256, which is immediately following position 255, not at the beginning of the next print line. However, an attempt to use the TAB function to place print statements at positions beyond 80 from the start of the current cursor line will result in unpredictable double spacing of lines on the screen, and triple spacing after TAB position 200. It is recommended that the TAB function be limited to 80 columns.

Tab, Adhesive A diskette is write-protected if it does not have a write-protect notch about one inch down on the right side. The notch could be missing altogether (as on the Apple System Master diskette), or covered over with an adhesive tab. This blocks a small spring-loaded switch or a light beam inside the diskette that is sensed by DOS diskette driver programs. You will get an error message ("Attempted write-protect violation") anytime you attempt to alter a file on a write-protected diskette by changing it, deleting it, copying a file onto the write-protected diskette, or formatting the diskette.

You are allowed to use files, load them, or copy from the write-protected diskette. The purpose of these limitations is to prevent accidental loss of the only copy of programs or data. In most cases, the procedure is to copy the write-protected diskette onto a notched diskette, put away the write-protected diskette as a permanent copy, then modify the notched diskette. In some cases, you will remove the adhesive tab from the write-protect notch and proceed to change the diskette.

It is a good practice to put an adhesive tab (supplied with boxes of diskettes) over the write-protect notch of any important diskette you will back up. Then if you accidentally ask for the backup in the wrong direction (from the old diskette to your important diskette), you will get a second chance to make the backup rather than losing your data.

Tab Forward See Tab Key.

Tab Key This key is not found on the Apple II/II+. On the IIe and III, it operates much like the tab key on a typewriter, moving the cursor to the next tab setting. Default tab settings are usually present to multiples of eight, but some programs, notably word processors, allow you to set your own tabs.

Tabbing A method of moving a CRT cursor or printer head to a pre-defined column on the screen or paper, called a tab stop.

Tabla de Adicion* Spanish version of Addition Tables*. Student chooses one addend and is given ten addition fact problems. Grade levels K through two. NTS Software.

Table Look-Up Method of converting one variable to a corresponding value, or verifying its accuracy by searching a list or table of entries for the known keyword or value. The corresponding values may then be extracted from corresponding positions in the table. Looking up a name in the phone book to find the corresponding number is an example.

Tablet Graphics* Similar to Paddle Graphics*, this Machine language software permits use of a graphics tablet. 48K. Sierra On-Line Systems.

Tablet Shapemaker* A utility that lets the user create Applesoft shape-tables from the tablet with indexing, hi- and lo-bit colors, and scanned blocks. These shapes can be modulated in the display mode. 48K. Rocky Mountain Software.

Tackler, The* This is a dual-mode parallel interface printer card for the Apple II/II+. Before using the board, you must install the proper ROM chip (purchased separately) for the printer that you wish to use. The selection of normal or intelligent mode is determined by the position of a switch on the front edge of the printer card. In the normal mode, the card acts like any other parallel interface; in the intelligent mode, you are also capable of dumping the hi-res screen to the printer in normal or double size, normal or emphasized type, normal or inverse (what is white on the screen, will be black on the paper) image, left justified or centered, and normal or 90-degree rotation. The Tackler also allows the simulation of a chart recorder by printing successive screens without any intervening spaces. Tymac Controls Corp.

TAN BASIC Function. TAN gives the trigonometric tangent of <x>. The format is:

<v> = TAN(<x>)

<x> is the angle in radians. Multiply by $\pi/180$ to convert degrees to radians. $\pi = 3.141593$

Tape—Hooking Up Cassette The Apple II and some of the earlier Apple II+ computers were supplied with cables to connect a cassette recorder for storage of programs, instead of using a diskette drive. While the jacks (connection points) are still on the back of the computer (including the Apple IIe), the cables are no longer sold as a part of the package. If you desire to use a cassette recorder as a backup storage device, you need two cables with a miniature phono jack on each end. One cable goes from the MIC or MICrophone jack on the cassette recorder to the CASSETTE OUT(put) jack on the back of the computer. The other cable goes from the EAR(phone) or MON(itor) jack on the recorder to the CASSETTE IN(put) jack on the computer. CASSETTE IN means "into the computer" and CASSETTE OUT means "out of the computer". All that remains is to plug the recorder into a power supply, press the PLAY and RECORD buttons together, and enter SAVE and RETURN from the computer keyboard.

Tape, Magnetic An inexpensive mass storage medium with the disadvantage of requiring sequential access. It is convenient for large files or archival storage. It is often the only external storage on very low-priced systems and is used as a backup for disk on larger systems.

Tape Drive Controller Package* This is a complete package with the hardware and software required to control an industry standard tape drive with your Apple computer. The I/O commands provided are REWIND, READ a block from RAM to tape, BACKSPACE, WRITE END-OF-FILE. Documentation is also provided covering the theory of operation, speed adjustments, card layout prints, and programming information. Electrovalue Industrial, Inc.

Tape Load Aids* Two utility programs to load programs and data from cassettes. Features confirmation of the load, auto-retry for bad loads, and auto-transfer to BASIC or RUN. Nibble.

Tapestry* An automatic program which allows the user to create tapestry designs. Paul's Electric Computer.

Target Diskette May Be Unusable A CP/M DOS message produced when implementing DISKCOPY. The target diskette may be incomplete because of an I/O error. An unrecoverable read, write, or verify error message precedes this message.

Target Diskette Write-Protected—Correct, Then Strike Any Key A CP/M DOS message produced when implementing DISKCOPY. A copy cannot be written onto the target diskette because it is write-protected. Either choose another target diskette or remove the write protection of the current diskette (this is not recommended).

Target Drive The diskette drive to which information/data is going. Source drive is the diskette drive from which information/data is coming.

Target Planner* A business planning program that merges data and formulas to obtain an output. The input parameters can then be changed in order to recalculate the model. Because the program must be written, the formula and logic are easily modified. Comes with complete documentation. It is possible, within limits, to change the basic configuration of the model. Two disk drives. Advanced Management Strategies, Inc.

Task A particular execution of a program.

Tax Advantage, The* A program that prepares your Federal Income Tax returns with a minimal amount of headaches. The Tax Advantage may be used to prepare the Federal Form 1040, Schedule A (Itemized Deductions), Schedule B (Interest and Dividend Income), Schedule C (Profit or Loss) From Business or Profession, Schedule D (Capital Gains and Losses), Schedule E (Supplemental Income Schedule), Schedule G (Income Averaging), Schedule SE (Computation of Social Security), and the Self-Employment Tax Form 4562 (Depreciation and Amortization). As many as three Schedule Cs for three different businesses may be prepared. As many as three properties for rent and royalty income may be included on Schedule E. The program is contained on a single disk that is not copy-protected. Data for each return prepared with The Tax Advantage must be stored on a data disk. The program requires an Apple II or Apple II+ with 48K in RAM, at least one disk drive (two are recommended), and a printer (if you wish to make hard copy of any output).

The Tax Advantage is adequate for most individual tax returns. It allows the taxpayer to project tax liability in future years by changing any number of assumptions on an experimental basis, then returning the original entries with a single keystroke. It is not recommended for complicated returns. The user should supplement the material presented in the program documentation by obtaining one of the general tax guides available at most newsstands or bookstores. Tax calculations are greatly simplified by this helpful program. Apple II, II+; 48K; two disk drives and printer recommended. Continental Software.

Tax Packages See Tax Software Packages and Accounting Software.

Tax Planner* Optimize your finacial decisions and reduce tax liabilities. You can input variable data to see the final consequences on your tax burden. It will help future investment decisions by projecting the tax liabilities up to nine years from the present. Tax calculations are made fast and easily. All information can be printed out for analysis. 48K. Apple Computer, Inc.

Tax Preparation* A complete tax package covering both state and federal schedules. All federal and most state forms are contained in the program. It features a flexible result calculation where you can input variable data to find the best tax situation. All information can be printed, including a sample 1040 return form containing the user's data. Updated versions are available as tax stuctures change. Aardvark.

Tax Preparer* This program is very useful for yearly record keeping and investigation of alternative tax strategies. The package is applicable to just about any tax schedule or form. Tax Preparer is strictly a record keeping program and not a program to advise you about optimizing your tax position.

Data entry and editing are convenient; itemized lists for various entries may be created. Up to 1,000 entries are possible. Output can be to the screen or to a line printer. The printed form may be sent directly to the IRS as part of your tax return (except form 1040, which can have output formatted and printed directly on it). Since tax laws frequently change, an updated package is available in January of each year. Printer recommended. Howard Software Services.

Tax Software Packages* There are many tax assistance programs on the market these days. Some of them have been described within the encyclopedia while others are listed below by name and vendor. Each program may have one or more unique features, but most are very similar. They help the user calculate tax liability; input variable data for comparing results; and print most or all worksheets, calculations, and standard forms.

Program	**Vendor**
Asset Mgmt. & Summary II	Salba Software
Deduction Recordkeeper (A VisiCalc* Template)	Exec Systems
Fixed Assets	Wilson Jones
Individual Tax Return (A VisiCalc* Template)	Exec Systems
Peachpay	Peachtree Software, Inc.
Peachtax	Peachtree Software, Inc.
Shortax	Syntax Corporation
Tax Advisor	Monument Computer Service
Tax Beater	Datamost
Tax Decisions	Eagle Software Publishing, Inc.
Tax-Manager	Micro Lab
Taxman-82	Atsuko Computing International

Taylor's Series Approximations* A graphic interpretation of Taylor's Series. This is an excellent technique to use when introducing Taylor's Series or for reinforcing the concepts presented in the classroom. 48K. Math Software.

TBMT Transmitter Buffer eMpTy. One of the five status bits of a standard UART. It becomes true when a buffer may be reloaded. See PE and OR.

TD Transmitted Data (RS-232C standard).

TDM Time-Division Multiple access. A networking technique for timesharing used for regulating signal flow between terminals.

Teacher Create Series* Teachers can create up to 100 questions. Formations of tests may be true/false, multiple-choice, matching, or short answer. Student grades may be evaluated. Educational Courseware.

Teacher for the Apple, A* A cassette-based introduction to the Apple. It starts with the basics of the computer and takes the user through every command. By the completion of the package the user will be able to run programs, make backups, organize files, and modify programs. Cassette. FlipTrack Learning Systems.

Teacher's Aide I* The value of this excellent program lies in its ability to create tests and produce them as hard copy or displays. Only one format (multiple-choice questions) is permitted. The menu-driven approach lets you create quizzes and files for student scores. You can also add, delete, or edit questions on a file. Two menus are provided: Student Program (output only); Teacher Program (file creation, update, and maintenance functions). 48K. Educational Software Professionals.

Teacher's Pet* An introductory computer program for the beginning student. Teaches arithmetic skills, counting practice, and letter recognition. Recommended for ages three to seven. Disk or cassette. Artworx.

Teaching Machine, The* An introduction to educational software. A series of programs that gives uses and examples. Program Design, Inc.

TEC65* A small section of DEC's TECO language that can be used as a powerful editor. It requires APEX DOS to utilize it capabilities. The 6502 Program Exchange.

Teddy Bear's Counting Fun* Preschool children will enjoy learning how to count from one to nine with six different color schemes. 16K. Homeware.

TEKSIM—The Apple II/TEKTRONIX 4010 Simulator* Use a host computer to create a computer graphics terminal. Consists of a read-only memory chip and an adapter device to plug into the D-8 socket. ABW Corp.

Teletype One of the oldest peripherals for communication with a computer; has the disadvantage of being quite slow (ten characters per second, or 110 baud).

Tell Star* An excellent, well-documented program for serious astronomers. It can forecast and find objects in the sky for any time and place on earth in the twentieth century. Inconsistencies are taken into account so that star and planet places are calculated accurately. Once a star is located, data like magnitude, right ascension, declination, time rises, and time sets are shown. Comes with calcuation program. 48K. Information Unlimited Software, Inc.

Telling Time* Teaches children how to tell time using traditional clocks and digital timepieces. Disk or cassette. Right On Programs.

Temple of Apshai* Search the many caverns and chambers of this ancient Egyptian temple for fame and fortune, but watch out for the giant mantis. Level of difficulty can be increased. Hi-res graphics. Automated Simulations.

Ten Commandments, The* After choosing the English or Hebrew version, the student studies each commandment in sequential order. Detailed explanations of each one are displayed, followed by a real life dilemma in which the student is asked to respond (keeping that particular commandment in mind). Two games are included to test comprehension. 48K. Institute for Computers in Jewish Life.

Tequila Sunrise* Input a time and place to this software and it will produce the sunrise and sunset times as well as the duration of twilight. More accurate than charts used for a similar purpose. For major North American cities, it is sufficient to input city name for the same results. Will generate formatted printouts of the day's solar events for a period of up to a year. 48K. Flight Opps.

Terminal Mode A mode of operation of a general purpose computer such that its CRT and/or printer can be used as a terminal for another computer. Also called terminal emulation.

Terminate Current Function To end, terminate, or break the current function of any BASIC program which you have written, and many commercial programs, press CTRL-C (both keys together). This will result, from a BASIC program, in the message "BREAK IN nnn," where nnn is the line number which was being executed when the break occurred. This does not clear the variables, and you can enter PRINT <xx> to determine the current value of variable <xx>. This technique is useful in debugging (q.v.) programs that you are writing.

Term/Whole Life Comparison* Analyzes the differences between whole life and term insurance policies and the side benefits of each. Under different conditions, separate reactions and investment benefits can be utilized. RE/International Systems Corp.

Test Data—Used in Debugging a Program See Debugging.

Test Sites—Alpha and Beta A test site participates with the originators of a hardware or software product to test it in a real-world situation.

Alpha test usually involves only a very few companies or individuals who realize that the product is incomplete or may have flaws. Alpha testers often are internal to the originating company or otherwise closely related.

Beta test sites are generally larger in number. They expect that the product is essentially complete and correct, and agree to use it in a real-world production situation. If errors are discovered, the originators ordinarily attempt to fix them rapidly so the beta sites can stay "on the air" with the new product. If numerous or serious bugs are found, the product may have to go back to alpha testing until an improved version can be presented for another round of beta testing.

Test Writer Teachers may construct up to 300 questions to create exams in a multiple-choice, true/false, or short answer format. 48K; printer. Persimmon Software.

TEXT BASIC Command. This command will display all text on the screen, 40 or 80 columns wide (depending upon your hardware) and 24 lines high. See Screen Soft Switches for more complete discussion of TEXT vs. graphics modes.

Text Editing Utility Packages Editing is an important part of computer programming. The user needs the ability to manipulate text easily for smooth and flexible coding. There are many packages that have individual features to make it stand by itself, while most are similar in the basic functions. The user should consult with a dealer or vendor to find the program that will satisfy their individual needs. Listed below are some of the programs currently on the market that feature text editing.

Program	Vendor
A.C.E. (Applesoft Command Editor)	Southwestern Data Systems
Apple Aids	Howard W. Sams & Co.
B.E.S.T.—BASIC Enhanced Software Tools	Sensible
Software Build Using	Sensible Software
CRAE (Applesoft Editor)	Highlands Computer Services
DATASM/65 Editor/ Assembler	Datasoft, Inc.
Disk Text Editor Edit—II	Services Unique, Inc.
Edit-Master	Applied Micro Systems, Inc.
Edit-Soft	Sensible Software
Edit 6502-General Description	LJK Enterprises, Inc.
Editrix	Data Transforms, Inc.
ES-CAPE (Extended S-C Applesoft Program Editor)	S-C Software Corp.
Flex Text	Beagle Bros Micro Software
Form-DS	Decision Systems
Forms Foundry	Phoenix Software, Inc.
GALE (Global Applesoft Line Editor)	Nibble/Micro-Sparc, Inc.
Global Program Line Editor	Synergistic Software
Macro-Assembler Text Editor (MAE)	Eastern House Software
Macro-SCED (Screen Editor)	Computer Station, Inc.
Manipulator, The (A Textfile Utility System)	Pear Software
Microproducts MDS	Microproducts
M.L.E., Lamp, Cal	Nibble/Micro-Sparc, Inc.
MPE (Memory-Page-Editor)	Compu-Tron Software Service
Pascal Programming Tool	Softpak Associates
Program Line Editor	Optimized Systems Software
Soft 70	Synergistic Software
Super KRAM	United Software of America
Superedit	Microcraft Systems, Inc.

Text Editor A text editor is an editing program specialized for text files. A text editor manipulates ASCII characters such as letters, punctuation marks, etc. Word processing programs are text editors. A specialized text editor is one designed to edit BASIC programs while they are being written. The Inspector (q.v.) is an example of an editor for non-text files such as Machine language programs. Non-text editors usually display and modify a byte of storage as either two hexidecimal digits or a three-digit numeric ASCII value. See ED and Edit.

Text File A file containing character data, letters, numbers, or special characters. Most data and programs that you write will be in text files. See Data File.

Text File—CP/M A file containing character data, letters, numbers, or special characters. These files may have any file extension. By contrast, an object or an executable file, such as the.OBJ,.COM, and .EXE files, may contain data which is not displayable as characters. Most data and programs that you write will be in text files. See Data File.

Text File—DOS When you save material from memory to disk, the Apple will save it in one of three ways: as a program (in either Applesoft, Integer, or Apple III Business BASIC), as a binary file containing Machine language instructions, or as a text file. The text file is the format to use if you wish to edit the material with a word processor which uses Applesoft text files (Apple Writer II* is one such editor), or if you wish to use the information in several different programs.

You can write a program segment or subroutine and then save it to disk using a "data capture" program, as follows:

```
1 D$ = CHR$ (4)
2 PRINT D$; "OPEN FILE NAME"
3 PRINT D$; "WRITE FILE NAME"
4 LIST 10,50000
nnn..............
nnn..............
nnn..............
60000 PRINT D$; "CLOSE FILE NAME"
60010 END
```

here nnn........... represents a line in your program or subroutine, and also represents line numbers greater than 4 and less than 60000 (in the example above, nnn represents numbers between 10 and 50000). You do not want to list the "data capture" lines, which are 1 through 4 and 60000-60010 in our example, only the ones of your program segment. After the command in line 3, all output will go to the disk; if you wish to watch this happen, type MON C, I, O before running the program. Don't forget to type NOMON C, I, O after you have captured the program segment as a text file. See MON and NOMON for further information.

Now your program is on disk as a text file; if you wish to include it in a later program, you need to include a line in your new program which states:

```
PRINT D$; "EXEC FILE NAME"
```

where D$ still is defined as CHR$ (4). You must make sure that your new program does not contain any of the same line numbers as are in the segment in the text file, or there will be a conflict. The EXEC command brings the contents of the text file into memory as if it had been typed from the keyboard, without all the extra work.

You may also use this data-capture method to take a program from memory as Applesoft BASIC and include it in a text file to be edited with a word processor, rather than using the more cumbersome editing capabilities (ESC -A, -B, -C, -D or ESC -I, -J, -K, -M).

Text Modes The Apple III Console Driver provides three distinct text display modes for the user. These text modes are defined by Text Mode Codes: ASCII characters which are provided to the driver in program lines. The text modes which are available are a 24- by 80-character black and white display, a 24- by 40-character black and white display, and a 24- by 40-character color display.

Textfilemaker Program The Apple III Business BASIC Manual lists a utility program that the user may key in and save to convert program listings to text files (which may be run as programs with an EXEC command). This program appears on page 30 of the Manual.

THEN BASIC Statement. This is the second part of the IF...THEN statement; it may never be used alone. See IF...THEN for a complete discussion of this statement and its uses.

Thermopak Thermodynamic Properties* An analytical device designed for engineers and scientists. Allows synthesis and analysis of specific chemical processes, power generation processes—even entire systems. Units in this software system are Thermo2A, Thermo2A/Dat, Thermoco, Thermupd, Shift3, Atoms, Equil, Vapor, Tot, Mfrac, Acid, Acidco, Koh, Kohco, Viscos, KV/DAT, Viscupd, Kond, Kondco, Sprnt3. Physical Sciences, Inc.

Thimble Printer Prints fully-formed characters with a thimble element. The thimble is like a daisy wheel with the type petals bent up 90-degrees to form a cup or thimble shape.

Three Body Orbits* Contains information on nine planets and thirty-two satellites. Displays the gravitational interaction of various configurations of planets and the sun. Teaches retrograde motion, perturbation, orbital precession, and synodic period. Edu Tech/Innovative Educational Software.

Three Mile Island Special Edition* A fast Machine language program featuring full-color graphics that simulate operating the Three Mile Island nuclear power plant. You can run this program in demo mode or direct the action yourself at normal and fast speeds. 48K. Muse Software.

Thunderclock Plus* This board will provide you with a real-time clock and an interface for the BSR-X10 Home Control System. The clock has an on-board battery; returns time in minutes, seconds, and hours; returns the date in month, day, and year; and has software-selectable interrupts. With the BSR-X10 Home Control System and Thunderclock you can program your computer to turn appliances on and off on schedule. Thunderware, Inc.

Time and Cost Recording System* Keep a running time charge for clients while working on the Apple. Up to 999 client chargebands can hold cumulative values automatically, and can be printed out at any time. Other costs can be inputed for variable cost and total cost listings. 48K; video monitor; and printer. Padmede Computer Services.

Time Clock II* A program to help you track and analyze the time you spend on specific jobs or projects. A detailed report is generated that assists you with billing, estimating, and scheduling. West Side Electronics.

Time Manager* A personal information and organizational system that includes diary, project coordinator, daily organizer, and accounting programs. Processing features include permanence, category, priority, and text portion. 48K. Image Computer Products, Inc.

Time Manager* Have a complete schedule for your business and personal appointments. Total recall of messages on a daily or monthly basis will remind you of important meetings or appointments. Files and records are user-defined and are flexible for any type of planning activity. Microsoft Consumer Products.

Time Master* A series of three programs that assists students in learning to tell time. With the first one, the student enters the time and the computer creates the clock face. The second has the student set the clock face and the computer tells the time. The third asks the student to enter the time; the computer then sets the clock face and the clock begins to tick and its face changes accordingly. 48K. Micro Power & Light Co.

Time Traveler, The* Look at the future and far into the past with accuracy. Calculate planet positions from 4713 B.C. forward. The accuracy for the very distant dates should calculate to within a degree of an arc. This program figures out a natal chart wheel with house systems of the user's choice. Matrix Software.

Time II* A real-time clock/calendar for your computer. Features time, date, program selectability, crystal control, on-board battery backup power, and a sixteen-sector disk that contains over twenty-five programs. Applied Engineering.

Time & Money Meter* Compute your clients hourly fees. It creates a complete billing report while timing events simultaneously. Telephone Software Connection.

Timemaster II* This card will plug into any of the expansion slots in the Apple computer, except slot 0 (Apple IIe does not have a slot 0); slot 4 is the default slot. The disk of programs may be copied and listed. You are advised to make a copy of the Timemaster II diskette even before installing the clock card. The Timemaster II can operate in either of two modes: Timemaster format showing day of the week, mm/dd/yy, and hh/mm/ss (twenty-four hour clock) or in the twelve hour clock mode with am/pm showing; and the Appleclock format which is the form used by the Mountain Hardware clock card, showing mm/dd, then hh/mm/ss, and then day and year.

There is a program on the supplied diskette which you should run first to set your clock; this will then retain the correct time with the power on or off (it is backed up by a Ni-Cad battery which will recharge whenever the power to your Apple is on).

Additional programs on the supplied diskette suggest ways in which you may use your clock card in your programs, both BASIC and Machine language. Documentation is supplied. Applied Engineering.

Time/Rate/Distance* A series of tests on distance, time, and rate after which the true motion is shown for comparison. Edutech, Inc.

Titration* A simulation of acid-base titration. A solution of unknown normality is presented and the student can control the titration process and observe it on the screen. Appropriate for high school through college levels. Mentor Software, Inc.

TKC Keypad A peripheral ten-key numeric keypad with addition keys for arithmetic functions such as parenthesis, +, -, *, and /, as well as the left and right arrow keys, ESC, space bar, and RETURN. It is of special help when entering large amounts of numeric data. With practice, it can be used by touch as a ten-key adding machine. Apple Computer, Inc.

Tn A parameter which may be used by PIP in CP/M. This parameter must be enclosed in brackets at the end of the command line which contains the PIP command. The letter "n" stands for the horizontal position of the TAB to be inserted as PIP processes the file. Tn is used to insert tabs as PIP operates.

Tokens for Keywords BASIC. Applesoft has tokenized or abbreviated the decimal/hexadecimal code for the keywords, which are the statements and commands covered in detail under their individual names. Tokens exist so that less memory storage space is occupied for these often-used words. Each token occupies only one byte of storage. A table of the keywords with their tokens follows:

Token Decimal	Hexa-decimal	Keyword
128	$80	END
129	$81	FOR
130	$82	NEXT
131	$83	DATA
132	$84	INPUT
133	$85	DEL
134	$86	DIM
135	$87	READ
136	$88	GR
137	$89	TEXT
138	$8A	PR#
139	$8B	IN#
140	$8C	CALL
141	$8D	PLOT
142	$8E	HLIN
143	$8F	VLIN
144	$90	HGR 2
145	$91	HGR
146	$92	HCOLOR=
147	$93	HPLOT
148	$94	DRAW
149	$95	XDRAW
150	$96	HTAB
151	$97	HOME
152	$98	ROT=
153	$99	SCALE=
154	$9A	SHOLD
155	$9B	TRACE
156	$9C	NOTRACE
157	$9D	NORMAL
158	$9E	INVERSE
159	$9F	FLASH
160	$A0	COLOR=
161	$A1	POP
162	$A2	VTAB
163	$A3	HIMEM:
164	$A4	LOMEN:
165	$A5	ONERR
166	$A6	RESUME
167	$A7	RECALL
168	$A8	STORE
169	$A9	SPEED=
170	$AA	LET
171	$AB	GOTO
172	$AC	RUN
173	$AD	IF
174	$AE	RESTORE
175	$AF	&
176	$B0	GOSUB
177	$B1	RETURN
178	$B2	REM
179	$B3	STOP
180	$B4	ON
181	$B5	WAIT
182	$B6	LOAD
183	$B7	SAVE
184	$B8	DEF
185	$B9	POKE
186	$BA	PRINT
187	$BB	CONT
188	$BC	LIST
189	$BD	CLEAR
190	$BE	GET
191	$BF	NEW
192	$C0	TAB(
193	$C1	TO
194	$C2	FN
195	$C3	SPC(
196	$C4	THEN
197	$C5	AT
198	$C6	NOT
199	$C7	STEP
200	$C8	+
201	$C9	-
202	$CA	*
203	$CB	/
204	$CC	—
205	$CD	AND
206	$CE	OR
207	$CF	>
208	$D0	=
209	$D1	<
210	$D2	SGN
211	$D3	INT
212	$D4	ABS
213	$D5	USR
214	$D6	FRE
215	$D7	SCRN(
216	$D8	PDL
217	$D9	POS
218	$DA	SQR
219	$DB	RND
220	$DC	LOG
221	$DD	EXP
222	$DE	COS
223	$DF	SIN

Token Decimal	Hexa-decimal	Keyword
224	$E0	TAN
225	$E1	ATN
226	$E2	PEEK
227	$E3	LEN
228	$E4	STR$
229	$E5	VAL
230	$E6	ASC
231	$E7	CHR$
232	$E8	LEFT$
233	$E9	RIGHT$
234	$EA	MID$

Tomorrowhouse* A package of five programs to help make your home more wonderful than it already is. Security Plus will maintain a security system that turns on all your lights if your house is broken into and records the time (to help catch the thief). It also has a "trouble" channel that will let you know about overheating, freezing, and power failure. Temperature Control acts as an "intelligent" thermostat, turning down heat when you are away, and up when you are about to return home. It will also monitor your hot tub. Temperature Monitoring will measure as many as sixteen different temperatures in your house and is helpful for greenhouses, solar equipment, a sick room, and so forth. With Wireless Lighting and Appliance Remote Control, you will be able to direct any light or appliance to turn on or off on a daily, weekly, or monthly schedule. Memo Board keeps a record of monthly, weekly, and yearly appointments. There is even a feature that reminds you vocally of specific projects! Using a speech synthesis feature, a voice offers you birthday greetings, announces time and temperature, and tells you when the security system has been violated. Digital, Etc.

Total Learning System* A versatile self-teaching aid. Learn anything from spelling, to mathematics, to a foreign language. Test your comprehension at the end of each lesson. Software by H, Inc.

Total Payables* Manage and maintain your current and old accounts payable by individual vendor. This system will also help you keep track of varying discounts by due date, cash payment requirements, etc., and it will print your checks and maintain records. Operating requirements provided by manufacturer. TCS Software.

Total Receivables* A system to generate invoices and monthly financial statements. Keep up-to-date information on your current and old accounts receivable with this easy-to-use interactive system. This package can be used with other TCS financial programs. Operating requirements provided by manufacturer. TCS Software.

TPA In CP/M, the acronym for Transient Program Area.

TPS Canadian Payroll System* Especially designed with the needs of the Canadian businessman in mind. This is a menu-driven program, originally designed to run on a microcomputer, that handles up to 100 employees per location, department, or branch. It will calculate payrolls for hourly or salaried employees over weekly, bi-weekly, or monthly pay periods. Time Proven Systems, Inc.

TRACE BASIC Command. This command will display each line number (in the form <nnn>) on the screen as it is executed by the BASIC interpreter. PRINT statements will also be displayed on the screen. Combined with the SPEED command (q.v.), this is a useful tool in debugging (q.v.) your BASIC programs. Once turned on, the only thing that will turn off TRACE is NOTRASE (q.v.).

Track & Sector List* A utility to retrieve data from any sector of a disk, edit the data, and rewrite the disk (for unprotected disks only). Disk volume numbers can be changed, hidden control characters can be found, tracks or sectors can be protected from access, and missing catalog entries can be fixed. 32K. Softagon.

Track Organization—Diskette Each Apple diskette is initialized to contain thirty-five concentric tracks (track 0 is the outermost track, track 34 the innermost), divided into sixteen sectors (DOS 3.3) or thirteen sectors (DOS 3.2) each. The VTOC (q.v.) is located on track 17 sector 0; the catalog files are usually located in the remaining sectors of track 17. Tracks 0 through 2 contain the DOS image, which is loaded each time the diskette is booted (q.v.). Some data diskettes are initialized without this DOS image to allow more space for data storage, but they then cannot be used to boot the system. The first program saved to an initialized diskette is stored on track 18, the next on track 19, the following on track 20, etc. If a program is particularly long, it will be stored on adjacent tracks if space is available. When information has been stored on all tracks from 18 to 34, the next program will be stored on track 16, then on track 15, then 14, etc. This means that the read/write head has less distance to travel from the VTOC to the desired file, thus decreasing the access time. As the diskette approaches capacity, it is not always possible to store all sectors of a program in adjacent locations; rather they are stored wherever there may still be space. Such a program will take a longer time to load. Since the read/write head will have to move in and out more often to find all the information. See Initialize a Diskette.

Tracking* Running accounts can be kept on a variety of business units. Use this program to evaluate performance of capital, personnel, investments, etc. Analysis reports you can generate include: sales analysis (territory, product, customer), and sales force performance (on an individual or group basis). Wilson Jones.

Trader* For those interested in trading markets dealing with metals, grains, instruments, and building products. This program will assist in flagging exchange trends. It is easy to operate and includes system calculation parameters, file editing/updating, action indicators, daily summary of each investment, relative strength index, and total diversified portfolio. Chemron Systems, Inc.

TranScribe* A spooler that sends printer output directly to the spooler rather than to the printer. After being written on hard disk, the program will then send the output to the printer freeing the computer for other uses. Consists of four parts that include a compatible replacement for the normal Apple III Console Driver, a compatible replacement for the parallel and serial printer drivers, a spooler driver, and a spooler status module. Quark Engineering.

Transfer Modes The Apple III Graphics Driver utilizes transfer modes as specified by the user to place color on the computer's screen.

Transient Commands These are files in CP/M COM (COMmand) files, that are programs or subroutines written in Machine language. These files are called "transient commands" since they are brought into the computer's memory only as needed and are replaced as the other files are needed. See COM and Transient Program Area.

Transient Program Area The CP/M operating system sets aside a specific portion of the computer's memory to hold transient programs for execution as these programs are required. This portion of memory is reserved by the system when it is booted and is accessed as required when such programs are run.

Transistor An electronic device which can use one electrical signal to influence another. The two main uses of transistors are as amplifiers and switches. Used as an amplifier, a transistor uses the changes in a small signal to make large changes in a large signal. Used as a switch, the transistor opens or closes a circuit depending on the state of a controlling signal.

Transit Analysis: Where and When* A program to discover what transits to a calculated radix occur within a given span of time. The user limits the planets transitting or those in the radix (that are being considered) and the accuracy of aspect determination; he can select which aspects are to be allowed; and he can specify and calculate a set of radix positions. The aspects are displayed in chronological order and give the transitting planet, aspect, name of radix point, date of transit, and positon of the transitting planet. The user selects transit aspects for an individual, several, or all planets. 32K. Matrix Software.

Transit Package* A package that will list time and date transitting aspects that become exact or fall within the orb you choose. Using the wide scope of choices available to you, choose the timespan, planets and other points and the detail that you wish. The program then stores this format for future use. The program will produce transitting aspects and mutual aspects between transitting planets and even transitting midpoints. You can do transits to chart factors or to any point that you specify in geocentric or heliocentric longitude or latitude, right ascension, and declination. Years covered are 1800-2000. AGS Software.

Transits & Secondary Progressions* Angles (RAMC, MC, ASC, VTX) and helio and geo longitude and latitude, RA and declination are available with this program. The radix chart is on a wheel of houses which includes the aspectoscope at the wheel's center. The user can look at transits or secondary progressions. On the left side of the screen are the radix angles and planets; on the right are the secondary (transit or progressed) positions. Other options include an aspectoscope which may be used to analyze secondary to radix positions or secondary to secondary positions. Also, the user may look at another transit or progressed date without reentering the radix birth data. Progressed "due" aspects within any year will be listed to screen. 16K. Matrix Software.

Translator* Translates programs written on Microproducts' four-character Assembler to run on their new six-character Assembler. Sensible Software.

Trap 65* This add-on device prevents problems caused by using op codes which are not implemented for your machine. When such an op code is encountered, the location of the code in memory is displayed on screen. Module plugs into the 6502 socket. Eastern House Software.

Tree Structure A collection of data organized so that each item is linked to one or more other items, creating a spreading network of linkages analogous to the branches of a tree. Genealogical data provides the classic model: each person has exactly one mother, but may have zero or more daughters. An example of data organized in this way might be the parts list of an airplane. The main entry is for the entire airplane. It is linked to the major components, such as wings, fuselage, tail. Wings, in turn, are linked to their smaller components, such as flaps, engine supports, engines, etc. Each of these can be further linked to smaller and smaller subassemblies, until individual parts such as nuts and bolts are reached.

Trend-Spotter* A tool that can be used by management in forecasting. It is composed of a personalized database with computer graphic displays and statistical information. There are two programs available: Database is used to store and manipulate raw data and can also be used to make future projections; The Display program retrieves the data from the files and offers it on the screen with a variety of graphic formats. Includes extensive documentation and interface features. Software Resources, Inc.

Triangle Solutions* Calculates unknown quantities for any triangle (including the area). It will also calculate the area of any polygon. 8K. Technical Software.

Trig/Circle Tangent* Converts between radians and degrees, displays any trigonometric function, calculates any unknown of a right or oblique triangle (five decimal places and/or degrees-minutes-seconds), and calculates x and y coordinates for tangent points (either one or two circles). Computer House Div./FLC, Inc.

Truth Table A table showing the logical value (true or false) of a compound logical expression, based on the logical value of the simple components of the expression. Example:

A	B	A or B
T	T	T
T	F	T
F	T	T
F	F	F

This table reflects the definition of OR: A or B is true if, and only if, either A or B or both are true.

TTL Transistor-Transistor Logic. Logic circuits based on bipolar devices, usually low-power Schottky circuits. These are fast but expensive because gold-plated Schottky diodes are required on every TTL bus input.

Tuner* Offers students a drill to test their perception of tunes. After listening to two tones on the computer that are less than a half-step apart, they can tune the tones up or down by pressing "R" for raise or "L" for lower. The computer will then indicate whether the match was successful or not by showing "Right," "Close," or "Wrong" on the screen. 48K. Conduit.

Tuple A tuple is part of the header section of a Data Interchange Format (DIF) file. The rest of the header is made up of TABLE, VECTORS, and DATA. Tuples are the equivalent of records in a DIF file. Vectors are the equivalent of fields in a DIF file. See Data Information Format Files.

Turbo-Traks* A combination of Music System, Soundchaser, the keyboard and an Apple II creates a performance package that will record, create sounds, orchestrate, and compose. Features sixteen-track digital sound on sound with overdubbing, real-time control, precise numeric control of ADSR envelopes, sixteen presets in memory, volume, pitch blend, and octave transpositon, giving the keyboard a seven-octave range. Present parameters include four LFO waveforms for vibrato and phasing so that each preset can be configured to contain from one to sixteen different audio oscillators per voice. Compute waveforms using additive synthesis, and add harmonics of a waveform for complex sounds. Passport Designs, Inc.

Turnkey Enterprises Analysis System* Gain cost of production information for a number of enterprises. With the help of General Ledger System, the expenses of an enterprise can be compared to income gained from the sale of the final product. Each enterprise has its own characteristic input values and an analysis must take each into consideration when reviewing the production costs. This system can identify the specific costs and help improve planning and productivity in the area of agri-business. Computerized Farm Information Systems, Inc.

Turtle* A tutorial for the Turtlegraphics commands. As the student types in commands, a turtle is seen on the screen. These commands are fully compatible with Apple Pascal Turtlegraphics. Edu Soft.

Tutorial Quiz Master* Allows teachers to construct their own exams for students. Each class will be able to advance at the pace the instructor feels is appropriate. An instruction manual is included to serve as a guide for the teacher. 32K. Random House School Division.

TWG/ARIMA* TWG/ARIMA is an analytical and forecasting program that ties a number of variables to an observation, then uses a rectangular format to analyze the data and to predict future activity of the variables. The program uses the ARIMA forecasting method. In plain English, ARIMA means Auto Regressive Integrated Moving Average. Begin using this program by configuring it to your computer system. This process is accomplished by using the setting system parameters option, which allows the specification of the disk drives used for the program and data. It also allows configuration for printer slot and line length in characters.

The next step requires that a database be set up. This particular step allows variables to be named and variable type to be set up. Data may be corrected, new data may be added easily, and may be printed as required. Variables may be transformed by running them through a transformation formula. Once data has been entered and set up for processing, it can be accessed from the ARIMA menu.

This menu allows data to be identified; used for estimation, diagnosis, and forecasting; and used for setting up seasonal models. The identification phase verifies transformation, tests correlation, and otherwise sets up manipulation of data. This statistical analysis program may be used to estimate and predict future activity of stocks and other investments from data already gathered, and to do many types of predictions. The Winchendon Group.

Two Populations* Displays the interaction of predator-prey populations with the Lotka-Volterra Equation. COM Press.

Two-Pass See Pass.

TYP Used in Apple III Business BASIC program lines to specify the type of data which is to be read from a file the next time that file is accessed during the operation of the program.

This command controls the utilization of data by the program. It requires that a numeric value associated with a specific type of file be placed in parenthesis immediately after the command is used. An example of this command is:

```
120 ON TYP(5) GOTO 1200
```

This line instructs the computer to GOTO line 1200 when a data type "5" is encountered. The data types are listed below:

VALUE	DESCRIPTION
0	Undetermined or unspecified data type
1	Data consists of real numbers
2	Data consists of integers
3	Data consists of long integers
4	Data consists of strings
5	Specifies End of File

TYPE CP/M Disk Command used to display the contents of a file on the screen. TYPE is an internal command, part of COMMAND.COM. The command format is:

```
TYPE <filespec>
```

The data in the file is displayed on the screen as is, except that TAB characters produce a tab over to an 8-character boundary (8, 16, 24, etc.). Non-text files (such as compiled programs) will not produce readable textual material.

The following two messages produced by CP/M DOS may occur while using TYPE:

```
FILE NOT FOUND
```

On the diskette in the default or specified diskette drive, the file name entered in the command does not exist.

```
INSUFFICIENT MEMORY
```

The commands requested cannot be performed in the available memory.

Type Attack* A game that teaches typing. The scenario takes place on the planet Lexicon. Letters of the alphabet and words start to attack and they can be deflected only by the correct typing of the word or letter. Consequently, if you wish to survive, you will quickly become an excellent typist. There are thirty-nine lessons and room for sixty user-defined lessons. Sirius Software.

Type Declaration Character BASIC. Variable names can end with a type declaration character: $ is for a string variable, % is for a numeric integer. If there is no type declaration character at the end of the variable name, the default numeric type is assumed. For the Apple II, the default is an integer; Apple II will not operate with real or floation point variables unless Applesoft is installed in memory (whether as RAM-loaded software or in ROM). The default type for the Apple II+, the Apple IIe, and the Apple III is real or floating point. See Names for a complete discussion of variable names and type dec-larations.

Type Formats—Printer Controlling with BASIC. To set the Epson MX-80 printer's print size, strike method or number of lines per inch down the page; the non-standard type format you want must be turned on by sending control codes to the printer. To do this, use the ASCII codes in the following table:

Type Format	**Turn On**	**Turn Off**
Compressed	15 (CTRL-0)	18 (CTRL-R)
Double Width	17 (CTRL-N)	20 (CTRL-T)
Emphasized	27,69 (ESC-E)	27,70 (ESC-F)
Double-Strike	27,71 (ESC-G)	27,72 (ESC-H)
72/7 Lines/Inch	27,49 (ESC"1")	27,50 (ESC"2")
8 Lines/Inch	27,48 (ESC"0")	27,50
6 Lines/Inch*	27,50	27,50
72/n Lines/ Inch#	n,27,50	27,50

* Standard 12 dots per line (72/12) = 6 Lines/Inch). Set when printer is initialized or powered on. Not effective after use of 27, 65,n to redefine result. See below.

#This resets the definition of "Standard."

Combinations of the three type sizes (normal, compressed, and double width) with four strike methods (single-strike, double-strike, emphasized, and emphasized with double strike) produce ten different type formats. In addition, each type format can be printed at any of three standard line spacings (6 lines per inch, 8 lines per inch, or 72/7 = 10 lines per inch).

Finer control of line spacing is available by using dot spacing (this also allows double and triple spacing). The Epson printer prints 72 dots per inch down the page. Each dot thus uses 1/72 inch.

The number of dots to be used as a print line can be specified. Twelve dots per line is the default, established when the printer is initialized or powered on. Twelve dots by 1/72 inch per dot = 12/72 inch, or 1/6 inch per line—thus 6 lines per inch.

The other two standard dot settings are 9 dots per line: 9 dots by 1/72 inch/dot = 9/72 inch, or ⅛ inch; thus 8 lines per inch; and 7 dots per line by 1/72 inch/dot = 7/72 inch/line; thus, 72/7 lines per inch (10.29).

Since 12 dots per line makes 6 lines per inch single spaced, 24 dots per line gives double spacing, 36 dots per inch gives triple spacing, etc. The following table gives some common values; you can use them from the table or verify your procedure for calculating them:

LPI	**Dots/Line**	**ASCII Control Characters Required**	**Alternate**
72/7	single 7	27,65,7,27,50	27,50
	double 14	27,65,14,27,50	None
	triple 21	27,65,21,27,50	None
8	single 9	27,65,9,27,50	27,48
	double 18	27,65,18,27,50	None
	triple 27	27,65,27,27,50	None
6	single 12	27,65,12,27,50	27,50
	double 24	27,65,24,27,50	None
	triple 36	27,65,36,27,50	None

Any number of dots per line, from 1 to 85, may be specified. Using the 27,65 in control character sequence redefines the default dots per line, which was set as 12 when you powered up the printer. Any subsequent use of the 27,50 "return to default" option will return to this new default, not 12 (= 6 LPI). To re-establish the standard default of 12 dots/line, use 27,65,12,27,50. Entering 27,65,n does not change the line spacing; it only changes the stored default line spacing. The 27,50 then moves the stored default line spacing into the current line spacing slot, making it effective immediately.

Using 27,48 or 27,49 changes the current line spacing, but does not affect the stored default line setting. A 27,50 control sequence will return to whatever you last specified as the stored default line spacing—or to the 12 dots per line stored at power on if you haven't changed the line spacing.

To send these to the printer from BASIC enter:

```
PRINT CHR$(27);CHR$(65);CHR$(18);
          CHR$(27);CHR$(50)
```

Remember that you can always reset all of the printer's characteristics to default values by turning it off and then back on. So if you get confused at any point, just turn it off, then on and start over with all default values.

Some programs do not allow full access to the printer's capabilities. One practical way around this is to set up the printer the way you want it before executing the program. The chief drawback is that it doesn't allow you to print certain parts of your document in one format, and others differently. Except for control characters recognized by your word processor or another program, this method only allows you to set up printing for an entire document.

One other technique that deserves a try is to embed the control characters in the text. Some programs will pass these through to the printer, others won't.

The following example may clarify how to change the type format. Suppose you want to print large, very dark characters at 8 lines per inch for a title. This could be accomplished by using double width, emphasized, and double strike all together. This is accomplished by the following BASIC statements:

```
PRINT CHR$(14) :REM
```

turns on double width

```
PRINT CHR$(127);CHR$(69) :REM
```

turns on emphasized

```
PRINT CHR$(27);CHR$(71) :REM
```

turns on double-strike

```
PRINT CHR$(155);CHR$(48) :REM
```

8 lines per inch

To return to standard printing, it is necessary to turn off each of the non-standard print options previously turned on, thus:

```
PRINT CHR$(20) :REM
```

turns OFF double width

```
PRINT CHR$(27);CHR$(70) :REM
```

turns OFF emphasized

```
PRINT CHR$(27);CHR$(72) :REM
```

turns OFF double-strike

Of course, multiple printer control characters can be given in one PRINT, so:

```
PRINT CHR$(20);CHR$(27);CHR$(70);
        CHR$(27);CHR$(72)
```

performs the same function as the three PRINTS listed above.

For printers other than the MX-80*, consult your printer reference manual for the correct codes to use for the various type formats.

Type 'N Talk* A speech synthesizer with unlimited use in educational programs. It is easy to interface with users' programs. The unit contains a small microprocessor, a Votrax speech chip, and a small amplifier that will power any small speaker. RS-232C interface. Votrax.

Type Set—6 Lines per Inch To set for this line spacing, enter BASIC statement:

```
PRINT CHR$(27);"2"
```

or

```
PRINT CHR$(27);CHR$(50)
```

Type Set—8 Lines per Inch To set for this line spacing, enter BASIC statement:

```
PRINT CHR$(27);"0"
```

or

```
PRINT CHR$(27);CHR$(48)
```

Type Set—72/7 Lines per Inch To set for this line spacing, enter BASIC statement:

```
PRINT CHR$(27);"1"
```

or

```
PRINT CHR$(27);CHR$(49)
```

Type Size—Compressed Print See Size Type—Compressed Print.

Typeface* An accessory for Word Juggler* that allows data to be sent directly to typesetting machines and lets the program communicate with computerized typesetting equipment. Quark Engineering.

Typefaces for Apple Mechanic* Features ninety-six fonts and twenty-six image table typefaces. Catalogues specific files for instant retrieval. Beagle Bros. Micro Software.

Typemaster* Designed to teach touch typing in the classroom. The teacher uses the word processor to enter drill material and the student is monitored by computer to meet the accuracy and speed objectives. Remedial tests are automatically presented for student use and hard copy shows student performance. Fullmer Associates.

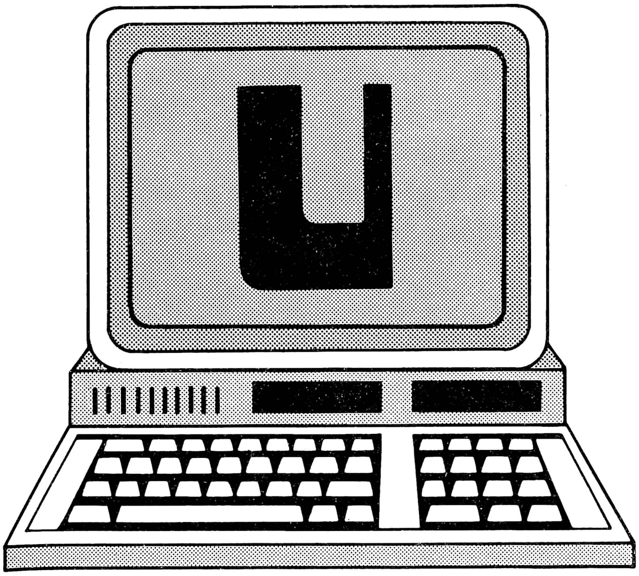
Types of Variable Names Rules in BASIC. See Names.

Typing* Six programs that teach finger placement and touch-typing for the Apple keyboard. Drills range from fairly easy to difficult. A speed test indicates over-all speed and lets you know which keys need more finger placement practice. 32K. Teck Associates.

Typing Teacher* Using behavioral learning principles, this hands-on educational program teaches anyone to master the typing keyboard. The program uses eight teaching phases to concentrate on drill, practice, and reinforced learning. The keyboard is displayed on the screen with finger positions; each student is asked to repeat finger placements. Each of the eight phases has ten exercises. Compu-Tations, Inc.

Typing Tutor* A fun program that helps you improve your typing speed. It uses a combination of paragraph drills and lessons for learning new keys; practice by using them with keys with which you are already familiar. Instant feedback is provided and the program creates lessons for you to work on in the future. Microsoft Consumer Products.

Typing Tutor II* An individual approach to learning and teaching typing on a microcomputer that can also be used in a large classroom. Personalized lessons and drills progressively lead you to better typing skills. Special timed response monitoring gives you feedback on your performance and then uses your weak points to create future lessons. Microsoft Consumer Products.



U Codes. ASCII = 85, HEX = 55. u—ASCII 117, HEX = 75.

U Underflow. Also, a lower case u is sometimes used to represent the Greek letter mu meaning micro.

[U] A parameter that may be used with PIP (in CP/M) by enclosing it in brackets at the end of the PIP command line. This parameter instructs PIP to convert all lower case characters in a file to upper case during the copy of transfer operation for the file.

UART Universal Asynchronous Receiver/Transmitter. A serial-to-parallel, and parallel-to-serial converter. Usually, a particular kind of IC used to interface a byte-parallel port to a bit-serial communications network or processor bus.

UCSD p-System An integrated program development system created by Kenneth Bowles at the University of California at San Diego. It includes an operating system, a full-screen text editor, and compilers for Pascal, FORTRAN, and BASIC. Although originally developed to teach programming, it has been enhanced to provide the tools necessary for large-scale programming projects.

The "p" refers to an imaginary, pseudo-computer. The system compilers produce p-code, which is very compact, and which would run on a pseudo-computer. An interpreter converts the p-code into acceptable code for the actual computer on which the program is run. This makes the system very portable, or easy to move between computers. Only a very small interpreter need be written for each computer on which the p-System runs. The p-System now works on over fifty different computers, with new ones being added all the time.

The system is highly interactive and consists of five main parts:

1) The full-screen editor allows you to write both programs and text. It is easy to learn and to use. There is also an advanced screen editor that has editing capabilities equal to sophisticated word processors.

2) The system compilers convert the source code which you write into p-code. The Pascal compiler is integrated with the editor. When a syntax error occurs, you can return to the editor at exactly the point where the error was detected. The compiler error messages are accurate and informative.

3) The system filer allows you to format disks, and to list, copy, rename, and remove files. File names may be up to sixteen characters long. The filer will also check for errors on the disk and mark any bad areas located.

4) The system linker will automatically link together separately compiled units of p-code. This allows you to build up libraries of useful procedures which can then be used by many different programs.

5) Finally, the interpreter converts the p-code to executable code. This is done automatically when the program is run.

The system is relatively easy to learn, and since it is highly integrated, it is very easy to use. Although expensive, p-System is useful for beginners, as well as professional programmers. There is also a full range of application programs available which run under the p-System, including spreadsheets, word processors, accounting programs, and a host of others. Several well known programs were developed using the p-System including VisiSchedule* from VisiCorp.

Excellent documentation is furnished by Apple in its manuals. Many examples of useful programs are provided, along with a tutorial in Pascal programming.

Alternate versions of the p-System are available.

UCSD p-System* A machine-independent operating system for 8-bit and 16-bit microcomputers. It allows you to work in any combination of UCSD PASCAL, FORTRAN-77, BASIC, and Assembly language. Other features include support for dynamic memory management and multitasking, screen editing, native code generating, Turtlegraphics, print spooling, and more. Softech Microsystems.

U-Draw II* Create, rotate, expand, and alter characters with keyboard commands. 32K. Muse Software.

UHF Ultra-High Frequencies.

Ultra Disk Test* Tests disk drives for physical deterioration, diagnoses electronic and mechanical operation problems, and verifies the data integrity of a program disk. Features a manual on-program execution, floppy disk drive operation, and explains minor adjustments. Computer Advanced Ideas.

Ultra Hi-Res Graphics* A utility graphics program written with HPLOT commands. It writes to disk and then to the printer without resolution restriction. Computer Station, Inc.

Ultra Plot* Mutli-capacity chart-creation system that will create scatter charts, line graphs, bar charts, pie charts, and map charts. The map comes in five colors and can be used to define sales areas. All graphs can be edited. The pie chart program (three colors) can be reformatted, re-defined, and has extra labeling. Statistics are: standard deviation, slope, Y intercept, standard error of estimate, regression line formula, and range. 48K. Avant-Garde Creations.

Unconditional Branching The movement of the operation of a program to a new location (line) which is out of numeric line sequence to accomplish a specific purpose such as READing data, PRINTing a header, or whatever.

Underline Symbol—Cursor. With some programs the cursor is the underline symbol which appears on the screen to let you know where an action (such as typing in a character, deleting, inserting, etc.) will take place. See Cursor.

Understanding Computers* A course in computers that teaches students basic computer literacy. Six main areas are covered: computer history, applications, hardware, software, computers and society, and computers in the future. Each subject area has corresponding workbook exercises and computer-based work to be completed. The course is written at the junior high level. 48K. Encyclopedia Britannica Education Co.

Understanding Sales Buying* A program that identifies and characterizes types of sales. Conditions of sale, pricing, and impulse buying are considered. MCE, Inc.

Underwriter, The* At last, small insurance underwriters can take advantage of computerizing their businesses. This program helps an underwriter keep track of client information, premium payments, renewal dates, changing regulations, and all the paperwork that goes into running this type of business. It's an insurance policy database that will help organize the office, let you function more efficiently, and aid in generating useful reports on the basis of the information that you store and access. Broderbund Software.

Underwriter, The* An insurance database which is particularly valuable to the independent agent. The program has six major data fields for information: name of the insured, name of the company issuing the policy, policy premium amount, policy expiration date, insurance agent/salesman, and a note field. These fields can be sorted in any priority depending upon your needs. 48K. Bob Sevedge.

Unicom Educational Management Series* A two-part school administration assistance aid. The Grade Reporting section keeps records for all students and instructors on a cumulative basis. The School Inventory section keeps track of all circulation materials and supplies. Have the information for any aspect of your school administration system at your finger tips. Unicom Division of United Camera, Inc.

Unidep* This program manages assets, calculates depreciation, investment credit, and bonus depreciation. Allows the user to experiment with different options. 32K. Natural Language Systems.

Uni-Solve, The Electronic Designer* A reviewing aid for those who like to design electronic equipment. There are twenty-four solution sets covering a wide variety of calculations, formulas, and electrical design theories. It comes with an easy-to-use menu for access to any set. 48K cassette or 32K disk. Edu-Ware Services, Inc.

Unistar I* Consists of pre-written IEPs for children with learning disabilities. The IEPs are divided into ten categories which meet legal standards. Teachers save time in evaluating and creating inputs, allowing them to spend more time helping children achieve their objectives. Southern Micro Systems.

Universal Business Machine* A spreadsheet that consists of a hundred-row by twenty-column table. Names are user-supplied. Includes eight standard templates: cash flow analysis, profit and loss, proforma balance sheet, real estate investment, sales forecaster, source and use of funds, job cost estimator, and inventory analysis. Spectrum Software.

Universal Computing Machine, The* A number calculation program that is handy for all aspects of accounting work. It handles number columns very well and includes easy cursor location functions. A value can be replaced to show its effect on the end result. Spectrum Software.

Universal Graphics* Move your images from the screen to printouts. You can choose a black and white printout or reverse image. Pictures can be cropped or magnified. You can select horizontal, vertical, or even diamond-shaped images. Manual included. Sympathetic Software.

UNIX A mini- and microcomputer operating system developed by Bell Labs which feature multiprogramming, a hierarchical file structure, and numerous useful utilities. See XENIX, C Programming Languages, and Programming Languages.

Unlistable BASIC* Makes your Integer BASIC program listings unintelligable. These programs can be saved to either cassette or disk, like any other BASIC program, and are the same length as the original. Pygmy Programming.

Unstack Same as POP. To remove from the top of a stack.

uP Microprocessor.

Up Arrow (↑) Pressing the Up Arrow (Apple IIe, III) will move the cursor up one line in the same column on the screen it previously occupied. See Moving the Cursor for additional information.

Up One Space Cursor movement. See Move Cursor Up Code.

UPC Universal Product Code.

UPI Universal Peripheral Interface.

Upward Compatible Indicates that programs developed for one version of a programming language, operating system, applications software package, or computer will work without alterations on an expanded, more powerful version of the same language, system, or package. For example, Integer BASIC, which is the language in ROM on the Apple II, will also operate on the Apple II+ if it is equipped with the appropriate language card or ROM chip. Applesoft programs will also work on the Apple II if a similar hardware modification is made; install Applesoft either by software in the language card/RAM card or in a ROM chip. The language does not require alteration; the computer does! Applesoft programs written for the Apple II+ will work whether the DOS (q.v.) is 3.2 or 3.3. Applesoft programs written for the II+ will also work on the IIe unless there is a reference to Slot 3 which is not compatible with the placement of the IIe 80-column card in Slot 0. Applesoft programs for the II+ will operate on the Apple III only in the emulation mode. See Program—Version or Release.

In hardware, upward compatibility refers to the possibility of building up to more powerful models without reprogramming. The Apple fits this definition to a large extent because of its capacity to handle large amounts of additional memory, disk drives, and other peripherals.

Uranian Planets (An Astrology Program)* Figures out the nine standard planets which are Moon and Lunar Node plus Uranian or TNPs, Cupido, Hades, Zeus, Kronos, Appollon, Admetos, Volcanus and Poseidon. An aspectscope is included for all of the planets and the Koch House cusps are calculated and are given planets in correct houses. 8K. Matrix Software.

Uranian Printing Package* Calculates a complete radix chart with all the Transneptunian planets: Cupido, Hades, Zeus, Kronos, Appolon, Admetos, Vulkanus and Poseidon. Many other options are included. Geocentric or Heliocentric mode is user-selected; horoscope is calculated for any place in the world for dates in this century; and two house systems (meridian and equal) are built in; other built-in house options include: Zero Aries on ascendant and Solar Houses (sun on the Ascendant), user-input ascendant; Astroglyphs for standard and Uranian planets; transneptunians; planets proportionally placed in a round wheel; table with planet abbreviation. 32K; 48K. Matrix Software.

us Microsecond (one millionth of a second).

U.S. Constitution Tutor, The* Learn all about this important document in American history. A series of 175 questions, with various levels of difficulty, tests your knowledge. A good aid for history students or those studying for immigration exams. Micro Lab.

USART Universal Synchronous/Asynchronous Receiver/Transmitter. A chip which handles all the operations associated with synchronous data communications, such as bisync.

USASCII Same as ASCII (q.v.).

USASCII-8 Same as ASCII (q.v.).

Useable Graphics—Demo Disk I* Develop your own games and programs by incorporating any of thirty-five pre-defined graphic routines. Includes hi-and lo-res plus over 400 sectors available for your use. 48K. Superior Software, Inc.

User A person who owns or uses a computer.

User Friendly Friendly programs for the operator (user) minimize frustration. For programs you write, the operator will most often be you. But if others will ever use your program, you need to give some thought to giving clear prompts (q.v.) for every item of input data, freezing the screen long enough for them to read or act on the information displayed, providing clear error messages if anything is entered incorrectly or error situations arise, etc. This is often referred to as human engineering—making the program easy to use as well as technically correct. Another term for this side of programming is making the program user friendly.

Several other guidelines exist for writing user friendly programs. If a complex series of data items has been typed in but some entries turn out to be invalid, the user should be able to reenter only the bad items. Error messages should indicate not only that an entry is invalid, but also in just what way it is invalid and, if at all possible, some hints as to how to correct it (such as a list of possible correct values).

User Group A group or club focused on an aspect of computers. Some clubs direct their attention to one particular computer; there are many Apple User Groups, some of which are listed below. Other groups focus on a language (FORTH Users' Group, Pascal Users' Group, etc.), on an Operating System (CP/M, etc.), on an area of application (accounting, education, science, graphics, etc.), or other aspects of computing. Many magazines on computing (q.v.) carry lists of clubs/groups and report on their activities.

User groups provide a valuable opportunity to get and give advice on Apple hardware, software, and applications. Often you can talk to someone who used a product you are considering buying. User group newsletters may also offer useful information. If you need a programmer or consultant, you may meet or hear about a good one at a User Group meeting.

The five largest Apple user groups are:

1. A.P.P.L.E (Apple Puget sound Program Library Exchange)
   21246 68th Ave., S.
   Kent, WA98032

2. Washington Apple Pie
   13329 Woodruff
   Germantown, MD 20874

3. Mini Apples
   1725 Crestridge Ln.
   Eagan, MN 55122

4. San Francisco Apple Core
   1515 Sloat Blvd., Suite 2
   San Francisco, CA 94132

5. NIAUG (Northern Illinois Apple Users Group)
   1274 W. Dunder Rd.
   Buffalo Grove, IL 60090

Using Reference Tables in an Almanac* Teaches you how to use almanac tables. Lists of information are displayed and the user is asked questions based on the information. A game follows the tutorial and is played in the same fashion with no penalty for wrong answers. Cassette or disk. Right On Programs.

Using Your Apple* A tutorial program in using the Apple and 3.2 DOS. General information about the computer is covered in the first few lessons. Later lessons emphasize practical information on files, hard copy, data handling, and other topics. DOS 3.2 is dealt with separately for learning commands and applications. Little Genius, Ltd.

uSPEED* This high-speed language system was derived from an extended version of FORTH. It is referred to as the "powerful, painless alternative to BASIC and Pascal." Running sixty times faster than BASIC, it offers high-speed hi-res graphics, is an extensive, structured language, and cuts your software development time in half. Applied Analytics, Inc.

USR BASIC Function. USR calls a Machine language subroutine. The format is:

USR <n>

The argument <n> is evaluated and placed in the accumulator ($9D through $A3) and a JSR (Jump to SubRoutine) to memory location $0A is performed. Locations $0A through $0C must contain a JSR to the desired subroutine. This JSR must be POKEd into memory previously.

The return value for the function is in the floating point accumulator. To return to the original program, the RTS (ReTurn from Subroutine) must refer to this location.

USRT Universal Synchronous Receiver/Transmitter. A serial to parallel converter for high-speed communications.

Utilities The software used for routine tasks. Utilities are designed to facilitate or aid the operation and use of the computer for a number of different applications and uses. Examples of utilities are an editor, a sort, a debugger, and a file handler.

Utilities See A.C.E. (Applesoft Command Editor); Amper-Interpreter Utilities; Amper-Search; Ampersoft; Amper-Sort/Merge; Apple Aids; Apple Crypt; Apple Concordance; Apple Doctor; Apple Flasher; Apple II Utility I; Apple Spice; Apple Tool Kit Assembler; Applesoft Editrom; Applesoft II Utility I; Applesoft Linefinder; Applesoft Plus Structured BASIC (APLUS); Applesoft Programmer; Applespice; Appletext—An Apple II Disassembler; Applewriter Graphics; Application Text Editor; ASCII Express "The Professional"; ASM/65 Editor Assembler; ASSM/TED 1.0; Audex; Automaniac System, The; AXE (Apple Extended Editor); Beneath Apple DOS—Bag of Tricks; B.E.S.T.; Binary-To-Applesoft Decompiler; BPILOT; Cactus Plot; Catalog CMND Menu/Disk Map in ROM; Circuit Analysis; Circuit Analysis Programs; Compiler Software (Utility) Packages; DAKIN5 Programming Aids 3.3; Dan's Disk Utilities; Disasm/65; Disk Utility Pack; DOS Toolkit; Einstein Compiler, The; EPROM Programmer; Expediter II+; File Fix; Fileshare; Frame-Up; Handicapped Typewriter; Hayes Stack Smartmodem; Hayes Smartmodem 1200; Hayes Terminal Program; High Speed Terminal Program; Histo-Graph; Hypersort; IBR (Incorporated By Reference); Image Printer-NEC; Inspector, The; Integer Fix, The; Integrity Plus; Intro/X-10; ISAM-DS; Karel the Robot; KRAM; Kussmaul Encyclopedia, The; Laboratory Tool Kit I; Lexicheck; Linker; Lisa 2.5 (Assembly Language Development System); List Master; Listings; LoadCalc; LPS II Light Pen System; Managing Your Time; Master Diagnostics; Master Diagnostics IIe; Memory Management System; Memory Test; Menu Generator; Micro-Courier; Microspeed; Micro-Telegram; Microverter MVS-505 Video Modulator; Mimic Speech Processor; Modelwriter; Modem Magic 2.0; Modem Program; Morse Trainer; Multi-Loader; Multi-Message; Munch-A-Bug; Nestar Cluster/One "Model A"; Omninet Local Network; Online; Paddle Shapemaker; Paint Master Scene Utility; Paralax; Pascal Graphics Editor, The; Pascal Interactive Terminal Software; Pascal Programmer; Pascal Utility Packages; P.I.T.S.; Print File Reader; Printer's Estimator, The; Printing Package; Printographer; Program Controller; Program Unload; Programmer, The; Programming Aides 3.3; Rainbow Writer; RAM Test; RAMDisk 320K Memory System; Roger's Easel; Routine Machine, The; S-C Assembler II Version 4.0; S-C Macro Assembler; Screen Scribe; Scroll Control; Security Plus; Simulators; Single Disk Sort; Slide Select Program; Slide Show; Slow List/Stop List; SOSclock III; Sound On; Speed Star; Speed-DS; Super Disk Copy 3.7; Super KRAM; Tablet Shapemaker; Tape Load Aids; TEC65; Track & Sector List; TranScribe; Ultra Hi-Res Graphics; Ultra Plot; Utility Book; Utility City; VC-Extender; VC-Loader; VC-Manager; Videoterm Utilities Disc; V-Utility (two vendors); and Zoom. See also Debugging Utility Software Packages; Sort and Merge Utility Packages; and Text Editing Utility Packages.

Utilities Diskette Apple III SOS is supplied to the user on the utilities diskette that comes with the computer system when it is purchased. This diskette contains all of the system utilities for SOS and should be backed up immediately and stored in a safe place. The backup should be used to format blank disks and set up boot diskettes and file storage diskettes. When the utilities diskette is booted, the Main Menu is displayed on the screen. This menu offers the user the following options:

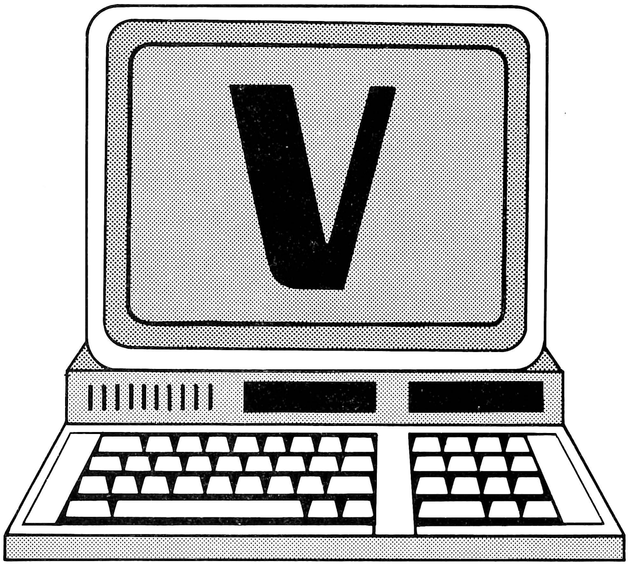
D—Device Handling Commands
F—File Handling Commands
S—System Configuration Program
Q—Quit

For a further discussion of these commands, see the entries for each one.

Utility City* A collection of twenty-one utilities. Includes programs to allow the programmer to protect his coding secrets (Command Zap, REM Zap, File Name ZAP, and Bigliner); a text screen formatter (Screenwriter); a decimal-hexadecimal converter; a program to run a second utility in memory without destroying the first (Double Loader); conversion from Integer BASIC programs to Applesoft (Int Converter); a merge to join two Applesoft programs (Connect); a program to locate any Applesoft line in memory (Search); a sort program (Sortfile); a program to allow listing of programs several columns across (Multi-Cat); a program to run a program from disk by pressing just one key (Key-Cat); a program which separates multiple statement lines into single statement lines for easier reading (Xlister); and a program which will dump whatever is on the screen to the printer (Textdump). 48K. Beagle Brothers Micro Software.

UUT Unit Under Test.

UV UltraViolet.



V Codes. ASCII = 86, HEX = 56. v—ASCII = 118, HEX = 76.

V Volt. Also, the overflow status flag.

[V] A parameter used with PIP program commands in CP/M. This parameter must be enclosed in brackets at the end of the PIP command line dealing with the file to be copied or transferred. This parameter instructs PIP to verify that the copy or transfer was made successfully.

V Command Cursor One of the single key cursor commands provided by the Apple III Console Driver is the V command. It resets the viewport to the full-screen size when the letter "V" is pressed after the ESCape key.

VAL BASIC Function. Returns the numerical value of the beginning of string x$. The format is:

<v> = VAL(<x$ >)

<x$ > is a string expression.

The VAL function strips blanks, tabs, and line feeds from the argument string and selects numeric characters in order to determine the result. If the first characters of <x$ > are not numeric, then VAL(<x$ >) will return 0. (See STR$.) Here is an example of this function:

```
PRINT VAL ("52 CASES")
52
```

Vantec 80* An 80-column video display board which gives your computer the capability of high-resolution graphics with an 80-column display. R.C. Electronics, Inc.

Variable A symbolically named entity which may assume an assigned value or a number of values.

Variable Message* Designed to make short messages more attractive. Colored characters are written on a background which can rotate or show colored "snowflakes." Centering can be either horizontal or vertical. 48K. Connecticut Information Systems Co.

Variable Names See Names.

VB-3 MicroKeyer* Allows the non-technical person (with no knowledge of video) to key graphics over any interlaced video signal. Some of the features include full-screen color matte, keyed output video, genlock sync generator, processing amplifier, half saturation, and inverse screen. Video Associates Labs Computer Division.

VC EXPAND* A program written for Saturn Systems by Micro Solutions, Inc. This program allows VisiCalc* users to access any of Saturn Systems' memory expansion cards up to 128K, along with a 16K RAM expansion card or a Saturn 32K card. The program and the memory expansion cards it uses are designed for Apple II and Apple II+ computers. Without the use of this hardware and software, the VisiCalc user is limited to a maximum of 64K of memory. This program makes up to 176K of worksheet space (space available after loading VisiCalc) available to the user who has installed Saturn 128K RAM expansion card and a 32K RAM expansion card in his Apple computer. It makes up to 160K available when the 128K expansion card is used with any 16K RAM card.

The program is easy for the novice to use. Best of all, configuration of the program is simple and straightforward. The user need not be a programmer to make use of the expanded memory. See VC EXPAND 80* (dealing with memory expansion) for more information. Saturn Systems.

VC EXPAND 80* VC EXPAND 80 is a program written for Saturn Systems by Micro Solutions, Inc. The program allows the VisiCalc* user to access an 80-column video display board and memory expansion cards on Apple II and Apple II+ computers. The program works with Saturn's 32K, 64K, and 128K RAM expansion cards. It also allows the user to expand memory further if he uses a language card or another 16K memory expansion card. Thus, with a 128K Saturn board and a 32K memory card, up to 177K is available for use with individual spreadsheets. This features allows use of all of the cells which VisiCalc makes available. Incredibly large and complex worksheets can be generated by the user. The program addresses the problem of how to save or load a sheet which is too large for storage on a single-sided, single density disk. To do this the user must have initialized two disks prior to trying to save a large worksheet. The first diskette must be inserted into the disk drive and the SAVE process must be started with the standard /SS command available to convert VisiCalc files to binary files (this command allows fast saving of files and subsequent fast loading when the /SR command is used). When the first disk has been filled, the SAVE process is interrupted and the following message is displayed on the screen: "RETURN TO CONTINUE ON NEXT DISKETTE." At this time, the first diskette should be removed from the disk drive and the second, blank diskette should be inserted. Then RETURN should be pressed and the remainder of the worksheet will be saved on the second diskette. The LOAD process works in reverse of the SAVE process.

VC EXPAND 80 does more than make extra memory available to the VisiCalc user. It also displays VisiCalc worksheets in the 80-column format by making use of a number of 80-column expansion cards manufactured for the Apple II and II+ computers. This makes VisiCalc compatible with the Videx Videoterm*, the ALS Smarterm*, the M&R Sup'R Term*, and the Vista Vision 80* video expansion cards. If your computer is equipped with upper/lower case capability through hardware installed in the computer or installed on a video expansion card, this feature is also available on VC EXPAND 80.

VC EXPAND 80 makes more memory and expanded video display available to the VisiCalc user with an Apple II or II+ computer equipped with one or more Saturn memory expansion cards and one of the video expansion cards described above. The program is extremely easy to use and is well documented. All the user does is insert the program disk in the primary disk drive, boot it, and follow the directions for configuring. The rest will be done by the program. Once configuration is completed correctly, all of the expanded memory and the expanded video display are available. It also allows optional use of other 16K expansion cards in addition to the Saturn cards. Saturn Systems.

VC/80 VC/80 is a program written by Micro Solutions, Inc., for Saturn Systems. It allows the user of 16 sector VisiCalc* to access several 80-column video expansion cards. This program operates on an Apple II or Apple II+ computer with a Videx Videoterm*, an ALS Smarterm*, an M&R Sup'-R'Term*, or a Vista Vision 80* installed in one of the expansion slots. Without this program or a similar program and the video display cards listed, the VisiCalc user is limited to a 40-column display of the Apple II or II+ computer. With the video display of the computer expanded to 80 columns, the user can see more of the sheet at once. This feature is helpful when sheets with more than four columns are being used. Without the feature, quite a bit of horizontal scrolling or GOTO activity is required to view or use a wide worksheet. If the hardware in your computer or on your video expansion card allows inverse or upper/lower case display, these features are also available with VC/80. The program is simple enough for a novice to use. It must be booted and is simple enough for a novice to use. It must be booted and configured to recognize the user's installation of a video expansion card. This process is simple and is well explained in the documentation which accompanies the program. Saturn Systems.

VC-Extender* Used to extend the VisiCalc* model memory. Includes three disk commands (F-FORMAT, W-WRITE, R-READ) and is free-booted. STB Systems, Inc.

VC-Loader* A program designed to change text files (which may have been created by a word processor or other means) into DIF files in order to load them into programs designed to use DIF files (such as VisiCalc*, VisiTrend/Plot*, or VisiFile*). The next file must be in the row/column format. Apple II+, Micro Decision Systems.

VC-Manager* Combine several VisiCalc* files or two DIF files into a single file. The calculations that merge files can include all standard math functions (addition, subtraction, multiplication, division, and exponentiation). Also, you can unite files with files or with a constant value. An example of a simple use of this program is: addition of four quarterly reports to receive a summary yearly report. Other uses are practically endless. Hardware requirements: Apple II/II+, VisiCalc*. MicroDecision Systems.

VDI Video Display Input.

VDT Video Display Terminal. The term used in the newspaper community for CRT.

VDU Video Display Unit. The British term for CRT.

Vector* In a Data Interchange Format (DIF) file, a vector is the equivalent of a field in a normal data file.

Vector Display A CRT which moves the electron beam randomly to trace figures on the screen. Contrast this with a raster display, which sweeps the beam through a fixed pattern, building up an image with a matrix of points. Vector displays are used in many arcade games.

Vector Sum* Adds up to twenty vectors (optional graphics display of addition). Vectors are automatically scaled to fit hi-res plotting grids. 32K; DOS 3.2 or 3.3. Indian Head Software.

Vector 4609 Interface Board* A peripheral board which has three different kinds of input/output connections for your computer. Use this board for special control applications, communications, or experimenting with different circuit boards. The miniature SIP-type connectors can be accommodated, as well as a standard 25/50 system bus and a 20/40 contact card edge connector. Vector Electronic Company.

Vectored Interrupt Interrupt scheme where information about the type of event which caused the interrupt is provided by hardware at the time of the interrupt.

Vectored Interrupt An interrupt which carries its identity number or the address of its handler.

Vectoring Automatic branching to a specified address. See Interrupt.

Ventop* An all-metal cover fitted with ventilation slits cut through the top. It may be installed on an Apple II or Apple II+ computer by removing the original plastic cover and inserting the Ventop. This device provides cooling capcity for operators who are using all of the available peripheral slots inside the computer and therefore are generating enough heat to eventually damage the components (unless a cooling device, such as a fan, is employed). The Ventop may be used without a fan since it provides adequate ventilation. Tovatech.

Verb Usage 1 & 2* Master verb usage upon completion of twenty lessons and four exams. Learn when to use the present, past, or past participle forms of several common verbs. Hartley Courseware, Inc.

VersaCalc 16* Learn some of the VisiCalc* features that are not documented. A set of three tutorials will help you understand and run VisiCalc more efficiently. The tutorials will help set up utilities and manipulate Applesoft to gain more efficient work and speed from VisiCalc. Aurora Systems, Inc.

VersaForm* Called a Business Form Processor by its manufacturer, Applied Software Technology, this program is a form-oriented database manager which is written in Pascal. VersaForm requires an Apple II or Apple II+ computer with a minimum of 48K RAM plus a RAM expansion card with a minimum of 16K additional RAM. It requires two disk drives; a printer, additional disk drives, a hard disk system, an 80-column display card, and external terminals are optional. The 80-column card and the printer, though, are recommended very highly. A hard disk system is also an asset, but floppy disk drives work just as well.

Data entry and data output are form-oriented with this program. VersaForm has error checking procedures for all types of data entry on the forms created by the user. It is capable of performing automatic calculations such as totals, subtotals, extensions, tax calculations, and several other types of calculations. It also supports automatic data entry based on a code or a part number. The program modules for VersaForm are Design-a-Form, Enter Data, Request Reports, and Print forms. The program comes to the user with six disks: the Design Program Disk, The Filing Program Disk, The Report Program Disk, The Copy/Print Program Disk, The Tutorial Disk, and the Report Work Disk.

Included is a tutorial that can be used with the Tutorial Disk mentioned earlier. A complete User's Guide explains the program thoroughly. The tutorial is especially useful to the first-time user of the program. VersaForm lets you use standard business forms or create custom forms for all your business record keeping.

Reports are generated by using the Report Program Disk. It is used to define a report or use an existing report, select the data to be output in the report, sort the data as specified by the user, and to print the reports. VersaForm may sound a little awesome with its six disks, but it is easy to master by using the tutorial and easy to use once it is mastered. It provides the user with a flexible, form-oriented database which is helpful to small and medium-sized businesses. Applied Software Technology.

VersaWriter* Allows you to create hi-res drawings in many colors on the screen. You can trace or draw freehand, store images on disk, create electronic schematic and logic diagrams, and simulate animation. Includes software programs such as Color Fill, Textwriter, Area/Distance, and Shape Tables. 32K. Versa Computing, Inc.

Version See Program—Version or Release.

Versions of Programs, Upward Compatible See Upward Compatible.

Vertex Business Software* A three-module package. Each module offers comprehensive operations and reporting. The modules are General

Ledger, Accounts Receivable, and Accounts Payable. 48K; two disk drives; 80-column printer. Sentient Software.

V/F Voltage to Frequency converter.

VHF Very High Frequency.

Vic Documenter* An English language transalator designed to give easy understanding of model formulas. Can be used as a training tool and to quickly debug new models. Print Options allow for list to screen or documentation on hard-copy. Desktop Solutions.

Video Boards To operate a high-resolution color monitor, it is necessary to install a video board which will convert the Apple's NTSC signal to the RGB signal.

Video Loom II* Simulates a thirty-two harness loom with sixty-four treadles. You can create colorful displays on the screen with little computer experience. This is a very fast program that allows you to change color and designs for beautiful images. The user has control over such things as warp and weft colors; thickness and spacing between threads; and choosing threading draft, tieup, and treading. Printouts can be made with the proper accessories. Laurel Software.

Video Marquee* Combines the best of a billboard and a slide show. You can create your own program that can be shown without disk after being loaded. Control the show with paddles at variable speeds. 48K. California Pacific Computer Co.

Video Output The video output of the Apple is NTSC compatible positive composite video. This means that the signal will operate directly to a composite video monitor or to a home TV set with the use of an RF modulator (see Sup 'R Mod*), but is not directly compatible with the RGB (Red-Green-Blue) signal used by high-resolution color monitors. See Video Boards for further information.

Video Signal An electronic signal containing information specifying the location and brightness of each point on a CRT screen, along with timing signals to place the image properly on the screen.

Videodisc Controller Card* Interface videodisc players with this board that fits into one of the eight slots of your Apple computer. The necessary software is included. Symtec, Inc.

Videoterm* An 80-column card with an optional keyboard enhancer and function strip. 40-and 80-column selection is accomplished with a switch. Additional ROMs can be added to the board for other languages or character sets. Videx, Inc.

Videoterm Utilities Disc* A collection of programming aids for use with the Videx Vidoeterm 80-column card*. You can mix graphics and text, create character fonts, add top and bottom scrolling windows, and read characters from Videoterm's memory. Also includes the Vidpatch utility for Pascal 1.1 with Firmware 2.0 through 2.3. Videx, Inc.

Video-300* A 12″ green phosphor video monitor. Features include non-glare screen for no-strain viewing, easy reading and operation; 18 MHz bandwidth and 900 lines (center) resolution; compatibility with every computer or word processing system; UL, FCC approved; and composite input. Amdek Corporation.

Video-300A* A 12″ amber phosphor video monitor. Features include non-glare screen for no-strain viewing, easy reading and operation; 18 MHz bandwidth and 900 lines (center) resolution; compatibility with every computer or word processing system; UL FCC approved and composite input. Amdek Corp.

Video-310A* A 12″ amber phosphor video monitor. The system features a non-glare screen for 18 MHz bandwidth and 900 lines (center) resolution. Amdek Corp.

Video-310G* A 12″ green phosphor video monitor. The monitor features non-glare screen for easy reading and operation. It includes 18 MHz bandwidth and 900 lines (center) resolution. Amdek Corp.

Vidichart* Using an analog converter, a Machine language display lets you see results as they are collected from an instrument. Curves can be shifted on the screen and expanded or contracted along the X or Y axis. Utility operations include commands that print length or any one of four data sets. Number operations let you add, subtract, multiply, or divide. You will also be able to integrate, differentiate or compute the moving average of a data set. Interactive Microware, Inc.

Viewport The viewport on the Apple III computer is the portion of screen used by the Console Driver to display text, or by the Graphics Driver to display graphics material. The viewport boundaries may be set by the user of both drivers by using keyboard control codes. Split screen displays can be set up by the user to protect displays which are already in place.

Vimshottari Dasas* Will calculate Hindu planetary periods, sub-periods and sub-sub-periods for any birth in history using a three-hundred-and-sixty or three-hundred-and-sixty-five-day year, and five commonly used ayanamsas. AGS Software.

Virtual Address A user-or system-generated address which references objects in a logical address space regardless of the physical memory location where they reside. A virtual address must be translated by the operating system into a valid physical address which may, in turn, involve the movement of data between primary and secondary storage (usually disk).

Virtual Memory The memory address space available to any process running on the processor. It may be larger than the physical memory.

VisiBlend* An add-on program that merges VisiCalc* files. 48K; Apple II/II+; Applesoft in ROM; DOS 3.3; two disk drives; and VisiCalc. Micro Lab.

VISI-CAIDS* Programs that manipulate VisiCalc* text files. Comes on a thirteen-sector disk operating under DOS 3.2 and supports one drive. The three programs available: are Label Splitter, which creates a more compact data display; Formula Reader, which prints or displays formulas, labels, and numbers; and PD Reader which displays or prints files similar to VisiCalc*'s files. Data Security Concepts.

VisiCalc* Personal Software, now known as VisiCorp, can be credited with greatly expanding the use of personal computers in the home and the office with the marketing of VisiCalc*, the original electronic spreadsheet. The VisiCalc program translates once complicated programming procedures into a form and methods that eliminate painstaking recalculations due to a simple change in figures. The program also provides sufficient processing sophistication to handle many business planning and forecasting needs.

Completed spreadsheets can appear formatted with column headings, explanatory remarks, illustrative bar charts, and tables of figures much like their paper counterparts. The sheets can be stored on disk, printed on paper, and can also pass on information to be processed by BASIC programs. This last type of exporting data requires the storing of data in DIF (Data Interchange Format) files.

The great advantage of VisiCalc over other forms of programming is in the clarity of the data presentation and the ease with which a person unskilled in computer languages can pick up and perform complicated data processing. VisiCalc is less useful when an application requires large amounts of data to be quickly entered into the program and processed.

When using a large template, with only 64K of memory (Apple II/II+) you may over-reach the capacity of the computer, although you have not filled all of the 16,002 cells on the VisiCalc sheet. 64K will allow you about 35K of memory for filling the sheet (the remaining memory is occupied by the program itself), which is equivalent to approximately 3000 cells. If you should try to exceed this number, the "remaining memory" indicator in the upper right corner of the screen will contain a flashing "M" and any attempt at keyboard entry will result in a beep. Blanking out some of your template will recover some of your memory, but you can gain approximately 1K additional memory by saving the sheet to disk, clearing memory, and reloading the sheet. VisiCorp.

VisiCalc Agri-Data* The person in agri-business can benefit with this management software program. Farm budgets, taxes, sales projections, and cost estimates are included in the package. The Computer Center.

VisiCalc Boolean Logic Teacher* A tutorial on the logical forms used in VisiCalc*. Includes copius and detailed examples of IF and AND as used by VisiCalc. Exec Systems.

VisiCalc Commands Teacher* An introduction to VisiCalc* commands. Each command is examined and explained with examples, both in the Manual and on the accompanying disk. Exec Systems.

VisiCalc Programming Teacher* Learn to use the power of the VisiCalc* structure to perform complex tasks. This tutorial takes you through increasingly sophisticated levels to teach you the VisiCalc functions. Exec Systems.

VisiCalc Templates Real Estate Analyst* See Real Estate Analyst*.

VisiCalc 3.3* An electronic worksheet that can be used in business, accounting, or engineering. By creating any format within the 63 column/254 row parameters, the user can quickly solve any number of problems which require calculations and manipulation of figures. The VisiCalc* worksheet can define any position as a value, label, or formula and any formula can relate to any combination of positions on the worksheet. By altering the value of any position, all other elements that are based on that value change automatically. Other features include arithmetic operations, financial functions, Boolean logic functions, an assortment of commands, file storage capacity, and excellent documentation. Uses Assembly language with 48K. VisiCorp.

VisiDex* An information organization and retrieval program which enables the user to file away any type of information and immediately recall it when needed. The program prints out lists, notes, and memos; it will keep track of your daily calendar, alerting you to upcoming events. VisiCorp.

VisiFile* A comprehensive electronic filing system that makes it simple to organize, maintain, and effectively use all the information a business needs. It will accurately store, search, sort, retrieve, display, calculate, and print reports, lists, and mailing lists. VisiCorp.

VisiList* Financial planners may use this program in financial analysis of files created through VisiCalc*. Computer Stations, Inc.

Vision 80* A video display card that provides the Apple II and Apple II+ user with 80-column display capability. This card provides upper case display and lower case display with true descenders. It uses a 9 by 10 dot matrix per line. 128 ASCII characters are available. It supports BASIC, FORTRAN, and Pascal, and is fully compatible with Z-80 cards and with the CP/M operating systems that are available for Apple computers. This video display card employs the shift key and a shift lock mode to provide the upper/lower case displays. Vista Computer Company.

Vision-128 128K Memory Expansion Card* May be plugged into any available slot on the Apple II, Apple II+, or Apple IIe computer. This memory expansion card is expandable from 64K to 192K and is compatible with Apple-compatible software. It operates automatically after the utility software sold by the expansion card manufacturer has been booted. The Vision-128 utility disk contains utilities that make the expanded memory capacity of the card available to you. It also contains a disk emulator utility. The Vision-AWII Preboot disk sets up the computer to make expanded RAM available to Applewriter II users; The Vision-VCE disk makes expanded memory available to VisiCalc* users. Action-Research Northwest.

VisiPlot* A plotting package that has a variety of business applications. You can format graphs; overlay several data series on the same graph; utilize line, bar, pie, and hi-low charts with overlays. Added features include title-making, automatic scaling of graphs, and an edit function. Personal Software, Inc.

VisiSchedule* This is the newest addition to VisiCorp's family. With VisiSchedule, the performance of complex project planning is relatively straightforward. Project line items are entered with cost, duration, prerequisites, etc. The program then calculates and displays the corresponding schedule with associated resource allocations.

Running on an Apple with 48K, the program can handle up to fifty line items; with the language card (or 16K card), 160 line items are handled.

VisiSchedule will handle up to 999 time units (1/1/1977 through 12/31/2065), and will recognize leap years. The program will only schedule on a daily or weekly basis. You may set your normal workweek and the holidays you wish to observe.

Some of the functions available from the Main Menu are: loading a program from disk, modifying or creating a program in memory, clearing the memory, deleting files from the disk, formatting the disk (requires Pascal format), saving the schedule in memory to disk, printing the schedule, changing the data disk drive (two to six disks supported), and writing to DOS.

A screen shift of 40 columns allows virtual 80-column reading. At least two disk drives are needed. VisiCorp.

VisiTerm* A communications program that allows you to link to other computers. You can access timesharing services, databases, stock reports, newswires, and other information systems. Other features include downloading capabilities, terminal configuration adjustment, and character set definition. Personal Software, Inc.

VisiTrend/Plot* A statistical and graphics package which enables the user to easily input, transform, and project time series data and quickly see the results in professional-looking charts and graphs. The program will automatically generate line, bar, pie, area, x-y and hi-low charts with numerous variations and options. VisiCorp.

Vitafacts Series* A six-program package designed to make you healthier and more energetic. Includes audio and program cassette. Personal Software, Inc.

VLIN BASIC Statement. In the low-resolution graphics (q.v.) mode, VLIN will draw a vertical line in the color selected by the most recent COLOR= (q.v.) statement. The format is:

```
VLIN <n1>,<n2> AT <n3>
```

will draw a vertical line from y (<n1>) to y (<n2>) at the horizontal position x (<n3>). All arguments (<n1>, <n2> and <n3>) must be in the range 1 to 40.

VLSI Very Large Scale Integration. A technology holding over 10,000 transistors per chip.

VMOS Vertical MOS. The technology used to increase the density of components per square inch, by cutting a V-shaped groove in the silicon substrate.

Vocabulary Prompter* A utility package that can be used to learn definitions and terms, sentence completion, arithmetic tables, conjugation of verbs, and language-to-language word learning. Includes a study option, data file creation, random test options, and a selection of language choices. Jagdstaffel Software.

Vocabulary Skills: Context Clues No. 7881* Strengthens vocabulary and punctuation skills through the use of definitions, examples, explanations, and drills. After reviewing the material and completing the practice tests, the student will become a fast and accurate writer. Level of difficulty increases. Milton Bradley Educational Software.

Voice Entry Terminals* These terminals control the voice of programs, data entry, answer recognition in training quizzes, and control of switches and appliances. Features include fast recognition, high accuracy, choice in command execution, simplified training mode, forty-word vocabulary sets, and demo programs. The VET-2 interfaces with programs directly off the shelf and can be written in both BASIC and Pascal. Shadow/VET permits full use of Apple memory and can run almost all software. Programs can be written in all languages. 16K. Scott Instruments.

Voice Input Module (VIM)* A module that allows you to communicate with your computer by spoken word and receive a digital response. It provides voice recognition and electronic components that represent the latest technology. The VIM consists of four vocabulary files and can be used with many existing Apple software packages. VIM can be purchased with a deluxe microphone assembly. Voice Machine Communications, Inc.

Voice, The* Have the Apple speak to you! This program gives the computer the ability to speak many common phrases, or create your own and store them on disk. You can speak from any BASIC program using the PRINT command. Muse Software.

Volatile Storage Storage which loses its contents when power is removed.

Volume Names Apple III SOS used the term "volume" to describe a disk used to store data, files, and programs. All volumes in use at any given time must have names distinct from those of other volumes. Volume names are assigned when diskettes are formatted. If no volume name is assigned by the user, the system gives it the name of BLANK2. The volume name may be changed by using the Rename a Volume option on the Device Handling Command menu found on the utilities diskette. Names can be anything that is convenient to the user. These names should be no longer than fifteen characters. The first character of a volume name must be a letter. Volume names must be preceeded by a slash when accessing them.

VOM Volt Ohm Milliammeter. A test instrument for measuring voltage, resistance, and current. It is usually portable, with an analog meter or digital display for readout.

Voter 30 (Multiple Response Learning System)* A peripheral system that allows many students to be involved in teaching and learning programs on a single computer. Each student has a keyboard from which he can respond to questions posed by instructors. 48K. Reactive Systems Inc.

Voyager I* Voyager I is a three-dimensional graphics adventure game subtitled "Sabotage of the Robot Ship." It is a solitary computer that challenges the human player to destroy all power generators and escape, or destroy the killer robots in the four levels of an alien spacecraft. Voyager includes color-animated graphics and sound capabilities. Avalon Hill Game Co.

VPOS The cursor position can be controlled on the Apple III's screen in Apple III Business BASIC by using the VPOS and HPOS command statements. The cursor is moved to the Vertical Position on the screen specified by VPOS. The uppermost line on the screen is line 1 when this command is used. The lowest line is the same as the overall vertical size of the screen (usually twenty-four characters). The vertical position of the cursor on the screen can be determined by typing

```
PRINT VPOS
```

followed by pressing the RETURN key. In the immediate mode, this command will cause the computer to return the cursor's vertical position.

VSS Voltage for Substrate and Sources, the ground for MOS circuits.

VSYNC Vertical SYNC signal in a TV. It determines the vertical position of the image.

VT-100 Emulator* Use your computer as a conversational terminal on RSTS/E-based, PDP-11 systems. Operates at 110 or 300 baud using a communications interface card that links you directly or through a modem. Features file transfer capabilities, greater flexibility by using modified RSTS/E prompt sequences, and will automatically configure your computer as a terminal to the PDP-11 system. 48K. Apple Computer, Inc.

VTAB BASIC Statement. Moves the cursor to the line on the screen specified by the argument. The format is:

VTAB <n>

where <n> is in the range 1 to 24; 1 is the top line on the screen; 24 is the bottom. VTAB will move the cursor up or down, but will not move it left or right.

VTC System Package* Comprised of five packages: Agency Data Management System, All Life-Calc Modules, VisiCalc*, Vernon Publishing, and Business Package. Vernon Tech Corp.

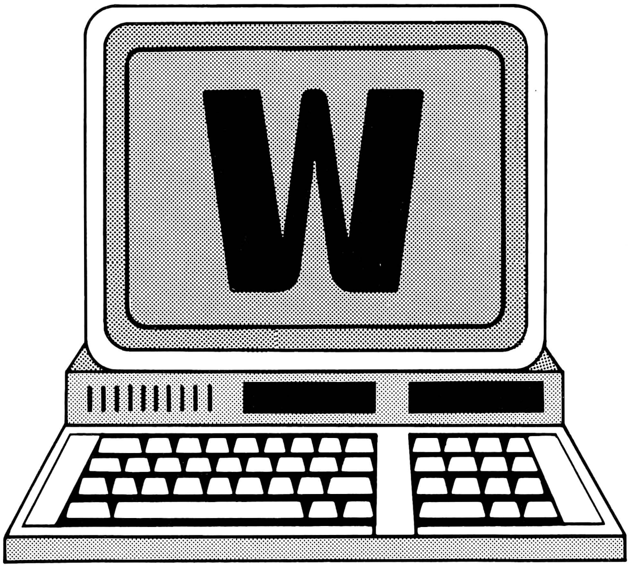
VTOC Volume Table Of Contents. Refers to track 17 sector 0 of standard DOS diskettes. In this sector is the information which allows DOS to locate all the files which are on the diskette. Some commercial protected diskettes move the VTOC to find the files, but examination of the diskette using ordinary DOS commands is not possible. For example, you usually cannot CATALOG a protected diskette.

VTR Video Tape Recorder.

V100 Interactive Voice Synthesizer, The* A database access tool that can be used with a telephone interface. Features direct telephone connection, auto-dial/answer, 1000-word vocabulary, software for sentence/library construction, and expandability. Vynet Corp.

V1100 8" Trimline Floppy Disk System* This slimmed down drive houses two double-sided eight-inch floppy drives, giving you 2.4 megabytes of storage capacity. Drive comes complete with power supply, voltage regulator, and cables. Vista Computer Company.

V-Utility* Four VisiCalc* utility programs which run by index and prompts. V-Print selects which columns are to be printed and the order of printing. V-Stat collects data from VisiCalc columns and performs calculations according to your specifications. V-Plot inputs data from a VisiCalc column and performs auto scaling on a printer. V-Overlay loads specified overlays onto the VisiCalc sheet. Yucaipa Software.



W Codes. ASCII = 87, HEX = 57. w = ASCII = 119, HEX = 77.

W Write.

Wafer A slice of a silicon ingot on which integrated circuits are fabricated. After testing and fabrication, the wafer is cut up into individual circuits called dice or chips. The dice that were not rejected in the wafer test are packaged and further sorted and tested before being used as finished IC components.

WAIT BASIC Statement. This allows a conditional pause to be inserted in your program to check on the status of bits at a given address in memory. The format is:

WAIT <n>, <m>, <x>

<n> is the decimal address which you wish to investigate; you want to determine if certain bits are high (1 or on) or are low (0 or off). The binary equivalent of the argument <m> determines which bits you are interested in; a 1 means your are interested, a 0 means to ignore the corresponding bit.

<x> is also a decimal the binary equivalent of which indicates the state you are WAITing for the bit in memory to be in; 0 means the bit must be high, 1 means the bit must be low. (Notice the difference in meaning from the discussion of the actual bits, where 0 is low and 1 is high.) If no third argument <x> is stated, a 0 is assumed. If any one of the bits in the second argument <m> matches the state for that bit indicated by the corresponding bit in the third argument <x>, the WAIT is over and the program resumes execution.

Wait State A micro-cycle or internal state entered by an MPU when a synchronizing signal is not present. It is used to synchronize a fast processor with a slower memory.

Wand A stick used to read the optically coded product labels (usually bar codes) found on retail sales items.

Warm Boot See Reboot DOS.

Warm Start See Reboot DOS.

Warp Destroyer* An arcade-style computer game which runs on Apple II, Apple II+, Apple IIe, and the Apple III computers in the emulation mode. The game may be played by one or two players who match wits with the computer by piloting their starship through space in warp drive and then try to blast their way through a mine field, a fleet of fighters, and bunch of robots before being destroyed. The game can be played with the keyboard, game paddles, or a joystick. Action is fast and graphics effects are well done. Sound can be toggled on or off by pressing CTRL-S. Once all of the obstacles have been overcome, the player must destroy the base on the alien planet. As each base is destroyed, the game becomes progressively harder. Piccadilly Software.

Wave Form The transmission of sound is often modeled mathematically and graphically. The shape of the graphical analysis is referred to as the wave form.

Way One of several electrical connectors printed on the connecting edge of a printed circuit board (cards).

WD Western Digital Corp., a manufacturer of processor and controller chips.

WE Write Enable. A control signal which allows writing to a memory device. Typically used to provide write-protection as in diskette and cassette drives. Also used in bank switch organization.

Weather Analyst, The* The user inputs daily precipitation and maximum and minimum temperatures to this weather analysis system which files the data. The program can then do a variety of calculations to determine current versus historical statistical results. With the package, you get the database of the National Weather Service monthly precipitation and temperature records dating back to 1951. 48K. Climate Assessment Technology, Inc.

Weather and Water* Includes four lessons aimed at grade levels four through ten. The first is about the earth's atmosphere, day/night cycle, and weather (including the seasons). The second is about the cycle of water precipitation and evaporation. The third discusses fronts in weather forecasting including clouds and storms. The fourth lesson expands on weather phenomenona including low pressure and high pressure systems, tornadoes, hurricanes, thunder, and lightning. 48K. BLS, Inc.

Weather Fronts* A tutorial on weather fronts, their movement, structure, and associated weather patterns, designed for high school and college students. It features diagrams in color showing warm and cold air. 48K. Teach Yourself By Computer (TYC) Software.

WEMA Western Electronics Manufacturers Association.

What's the Score?* Helpful to the novice student interested in statistics, this well-organized program teaches you about scores, variables, means for organizing sets of scores, score tables, and picture score graphs. 32K. Micro Power & Light Company.

Whole Brain Spelling A2-ED1*. If you have ever suffered the agonies of Friday afternoon spelling tests in school, then this program will help you. There are no scores, no arcade games, no "fun." Rather it is an attempt to help you use all your facilities to recognize and remember the correct spelling of words which are giving you difficulty. There are 200 lists of ten words each, ranging from "gem" and "false" all the way to "morphemic" and "idiosyncracies." Lists were selected from the New Iowa Spelling Scale developed at the State University of Iowa Bureau of Educational Research and Service.

You can look at each list in its entirety and skim over the various lists; it will display each word in large colored letters and then erase it while you toggle back and forth by pressing the space bar. If you spell a word correctly, the word will reappear in the box and shimmy as if in ecstasy over your good work! If you make an error of ommission, the space where the letter is missing will be marked with a carat (—); incorrect letters will be replaced with inverse spaces (light boxes on a dark background). While it is possible to run this program on a monochrome monitor, some of the special feedback will be missing, as color is used to highlight the areas which need correction. A disadvantage is that there is no quit choice on the menu; the only way out is to turn off the machine. Sublogic Communications Corp.

Whole Numbers* Includes addition, subtraction, multiplication, division, flash cards, speed math, names and numbers. This program comes with a Teacher's Guide. 32K or 48K. Educational Teaching Aids Div.

Width Line length on printer. The Apple II/II+ screen is limited to 40 characters which limits the line length on the printer to the same 40 columns during program listings. To take advantage of the full 80-column width of the printer, use the following key sequence:

```
CTRL-I 80 N <RETURN>
```

This will produce a ?SYNTAX ERROR message but now the printer will use the full 80 columns for the listing; however, the output is JUST to the printer and is not echoed to the screen. To recover the screen display, enter:

```
CTRL-I I <RETURN>
```

(Type carefully because you cannot see the CTRL-I on the screen).

Width Adjuster* Prints or displays VisiCalc* models with variable column widths; can print columns as small as one character wide. Data Security Concepts.

Wild Sign* Insert eight words and the Apple will move them about on the screen. Paul's Electric Computer.

Wildcard, The* This interface board for your Apple computer will enable you to break a program which is running and make a copy of it. It works by moving the program in RAM onto your RAM card and moving the program residing on the EPROM into the Apple RAM. From this point, you push the RETURN key or the R key (depending on the size) and the program on the RAM card is saved. The Wildcard is made only for backup copies of protected programs. East Side Software Co.

Winchester Disk A hard disk system characterized by very light read/write heads, low head-to-disk clearance, and complete enclosure of the magnetic media in a dust-free environment to achieve high information density and fast access-time. In the world of microcomputers, hard disk and Winchester disk are essentially synonyms.

Winchester Disks* This is a 6M, 12M, or 20M Winchester disk subsystem. An optional tape cartridge is available for backup. Tallgrass Technologies.

Winchester Hard Disk Drive-5M* This is a standalone 5M, 5-inch Winchester hard disk drive. Orion Software Associates.

Winchester Hard Disk Drive-10M* This is a standalone 10M, 5-inch Winchester hard disk drive. Orion Software Associates.

Winchester Hard Disk Drive-20M* This is a standalone 20M, 8-inch Winchester hard disk drive. Orion Software Associates.

Winchester Hard Disk Drive-40M* This is a standalone 40M, 8-inch Winchester hard disk drive. Orion Software Associates.

Winchester Hard Disks* An add-on, 5 ¼ inch Winchester hard disk subsystem; 5 and 10MB. Data Compass Peripheral Products Group.

Winchester/5 Disk Subsystem* A 5M subsystem with expansion chassis providing a complete hardware and software interface to add five megabytes of Winchester disk storage to the Apple. This approach to disk expansion provides additional disk storage and much needed system slots for continued growth. Tecmar, Inc.

Winchester/10 Disk Subsystem* A 10M version of the PC-MATE Winchester expansion options, including the expansion chassis. Tecmar, Inc.

Wind Energy Calculations* Assists wind power researchers or hobbyists in determining the interaction of various natural and windmill design elements. The user can input a range of values for windmill size, revolutions per minute, kilowatt-hours output, wind speed, tip-speed-ratio, and more. The program will then help you determine the most efficient combination of variables, and ultimately to understand the principles involved in designing wind powered devices. 16K; cassette. Charles O'Neill.

Window A section of a CRT screen dedicated to displaying specific types of information. See Split Screen.

Window, Text It is possible to control the width of the screen through which information will scroll, conversely protecting the rest of the screen from change. To set the width of the window, the format is:

```
POKE 33,<n>
```

<n> is in the range 1 to 40. *Do not* set n to 0, which will cause Applesoft to bomb. If <n> is less than 33, the PRINT command's third field (see Print Zones) may be off the screen if you are not careful about where you set the left margin. After you have set the width of the window, you may then set the left margin of this window by:

```
POKE 32,<m>
```

<m> is in the range 0 to 39. To ensure that all your text is displayed on the screen, <m> =< 39 -<n>.

You may also have the text window full width but narrowed from top to bottom, by using the following POKES:

```
POKE 34,<t>
```

will set the top of the text window. <t> is in the range 0 to 23; 0 is the top line of the screen. POKE 34,5 will not allow text to be printed in the top five line of the screen. POKE 35,17 will not allow text to be printed below line 17 of the screen.

You should be careful not to set the top of the text window lower than the bottom, or conversely, to set the bottom higher than the top.

Wire Wrap A mechanical method for connecting wires in complex circuits. Each wire is tightly wound several turns around square posts to make the electrical connection. This technology is seldom used now except for hardware during system development.

Wiremaster* Ever get lost in the maze of wiring layouts? This program helps you figure out the design, mapping, and construction of electrical hardware. It can also be useful for error checking and trouble shooting of PC boards. Input specifications are translated into network maps and show the suggested requirements (pins, wires, lengths, and levels). 47K is the minimum memory requirement. Afterthought Engineering.

Wizard and the Princess* In order to receive the kingdom as a reward, you must overcome many dangerous obstacles to save the life of the princess. Sierra On-Line Systems.

Wizardry* One of the classic fantasy role-playing games written for the Apple. Game play occurs within a three-dimensional maze made up of twisting corridors, rooms hidden behind closed doors which the player kicks open, stairways to different levels, teleporters, and dark spots. The player challenges the computer in this intricate game. You can create up to twenty characters; as characters are created, they are named, given various attributes (strength, piety, dexterity, IQ, agility, vitality, and luck) and a small amount of gold. The player must decide the race of the character (human, hobbit, dwarf, elf, or gnome), the alignment of the character (good, neutral, or evil), and the class of each character (fighter, sage, priest, or thief).

This game is tough. It has many addicts who communicate through letters to magazines. Once hooked, a player may very well play the game for hours each day. It is a game for children over ten and for adults. Some of the battle sequences are really exciting and deadly for the player's characters. Those who take the time to learn and master Wizardry and its sequels will find themselves in the midst of a never ending fantasy adventure. Sir-Tech Software, Inc.

WOM Write-Only Memory. Usually used as a semi-humourous term for parts of the address space of a computer which are not actually populated with memory devices or must be disabled for some reason.

Wood Heat* Compare your existing energy costs against the projected cost of heating with wood. 48K; cassette. MPA Enterprises.

Word A logical unit of information. It may have any number of bits, but for MPUs, a word is usually 4, 8, 16, or 32 bits.

Word Handler II* An easy to learn and easy to use word processing program. The text display is sixty-six columns. Although limited, the command structure makes sense and includes most of the common word processing commands. One special feature is a mode which allows the production of a "form" document which requires fields to be filled. The old forms are kept intact for future duplication. Small pages are also possible with Word Handler II: four pages per one 8 ½ by 11 inch standard. 48K. Silicon Valley Systems, Inc.

Word Juggler* A word processor, written in Assembly language, that is easy to use, includes over twenty sophisticated editing commands, can easily handle print formatting, can chain documents, read VisiCalc* files, and has form letter production capabilities. Quark Engineering.

Word Painter* A word processing system that will help you to revise all types of documents, reports, and other written materials. Includes all standard word processing functions. Apple Computer, Inc.

WORD Plus, The* A program that locates errors and does necessary corrections in documents. It is compatible with most CP/M based word processors, offers a 45,000-word dictionary, is fast, and offers additional features not found in other systems. Oasis Systems.

Word Prep (Basic)—Vocabulary Drill* Test your vocabulary with up to 500 pre-defined or 1,000 user-defined words. Words are picked randomly for a thorough drill session. Micro Power & Light Company.

Word Processing Software See Word Processors, Spelling Programs, and Auxiliary Word Processing Programs.

Word Processor See Apple Writer II, Apple Writer II-IIe by Paul Lutus, EasyWriter Professsional, Peachtext Word Processor, Pie Writer, Sensible Speller, and SpellStar.

WORD Processor, The* Has the ability to locate and scan phrases or words upon request. Includes Bible text and complete instruction manual. 48K. Bible Research Systems.

Word Processors A variety of word processors are available for Apple computers. These are usually screen-oriented systems that are easy to learn; have displayed command menus; search and replace features; special page formatting; powerful print commands; easy column alignment; easy text insertion; on-screen formatting; and character, word, or line erasure. Most systems also have particular special features that distinguish one from the other. Please contact the vendors of each program for more information.

PROGRAM	VENDOR
Apple-Scribe 2	Pygmy Programming
Applewriter Extended	Brillig Systems Inc.
Correspondent, The	Southwestern Data Systems
Datacope Scribe Word Processor	Datacope
Docuwriter	Charles Mann & Associates
Final Word, The	Mark of the Unicorn
Form Letter Module	Muse Software
Form Letter System	Artworx
Format II	Kensington Microware
Gutenberg Word Processor, The	Micromation, Ltd.
Letter-Carrier, The	Target Enterprises
Letter Perfect	Mike Rowe Productions
Lexicom	Nibble/Micro-Sparc, Inc.
Magic Window	Artsci, Inc.
Magic Window II	Artsci, Inc.
Master Text Processor	Charles Mann & Associates

PROGRAM	VENDOR
Original Easywriter	Information Unlimited Software, Inc.
Personal Secretary, The	Sof/Sys, Inc.
Pie Writer	Hayden Book Company
PowerText	Beaman Porter, Inc.
Printer Typer	Indian Head Software
Professional Easywriter	Information Unlimited Software, Inc.
QText	Intelligent Computer System
Report Writer	Monument Computer Service
Screen Writer	Sierra On-Line Systems
Script II	Apple Computer, Inc.
Select	Select Information Systems
Super Apple Textwriter	Mint Software
Super Message	Connecticut Information Systems
Super Text	Muse Software
Superscribe II	Sierra On-Line Systems
Text Editor I	Dynacomp
Text File Editor	Edu-Ware Services, Inc.
Text Power	Systems Design Lab
TextWriter III	Digital Marketing
Txt/Ed 2.0 (Word Processor)	Systems Design Lab
Word Handler, The	Silicon Valley
Word Processing	MPA Enterprises
Word Processing Program	RE/International Systems Corp.
Word Processor II	M.D. Software Inc.
Wordpower	Connecticut Information Systems

Word Processors The following products have been reviewed within this encyclopedia. See Advanced X-Tended Editor (AXE); Apple III Word Processor, The; Bank Street Writer, The; Bibliography; CavriDex; Correspondent, The; DataStar (Rev. 1.1); Dic-Tio-Nary II; Dictionary Skills; Dictionary, The; Disk Text Editor Edit-II; Dr. Memory; Easywriter Professional; Font Writer; Format ROM; GlossaryOne; Goodspell; Grafpak; Hebrew II Plus; Magic Wand 2.0; Maps/WP 6502; PeachText (Magic Wand); Pen Pal; Pie Writer; Professional Information Manager, The; Quick File III; Regress; Report Editor; Routine Machine, The; Screenwriter II; Soft Seventy; Soft-Step; Spellstar; Super Message; Superedit; Supertext 40-56-70; Word Handler II; Word III; Word Juggler; Word Painter; Word Plus, The; Word Processor; Word Weaver II; WordStar; Wozpack II; WRITE-ON!; and Zaradax.

Word Race* A dictionary word game for up to four players. There are three levels of play for early teens through high school students. 48K. Don't Ask Software.

Word Structure* Improve your writing and speaking abilities by increasing your knowledge of language and grammar construction. Progressive learning techniques are used to strengthen skills in such areas as spelling, capitalization, prefixes, and suffixes. A teacher's manual is included. Borg-Warner Educational Systems.

Word Weaver II* A word processing program that includes advanced edit commands based on the program line editor. Synergistic Software.

Word Wise Authoring* A vocabulary development aid for primary school students (grades one through three). The object is either to fill in the blank in a sentence with a word or phrase, or match a word with a picture. Package includes teacher utilities, with which the teacher creates and edits lessons and menus and the student presentation that contains the actual lessons. A picture library module, so that teachers may create their own picture lessons, is sold separately. A manual is included for both students and teachers, along with lesson planning worksheets. 48K; DOS 3.3. Ties Minnesota School District.

Word III* A program that offers boldface printing, character inserts, display of reference screen, editing, format features, printing, text addition, repair program, and automatic display. System Decisions Group.

Word-A-Tach* Race against time as you test your memory capabilities and concentration level. Words flash on the screen for a few seconds and you must repeat the each word into a tape recorder for reviewing later. Hartley Courseware, Inc.

Words, Reserved BASIC reserved words have particular meanings in BASIC and are used for commands, statements, function and operator names. These words cannot be used as variable names; and a variable name cannot be a reserved word followed by a type declaration character ($, %).

The reserved words are delimited (separated with a space or spaces around them) so that they are easily recognized by BASIC. If you accidentally use one of the reserved words, you may see an error message or have strange results when you execute the program. See Debugging Programs and Reserved Words for the complete list of BASIC reserved words.

Wordskill for the Microcomputer—Grades 7-Adult* Choose any of four games to increase your language skills in the areas of analogies, antonyms, definitions, and synonyms. Compete against a friend or against the computer. An instruction manual is included. Science research Associates, Inc.

WordStar* This word processing system has become one of the most widely used programs in the world. While WordStar only runs on microcomputers, it still ranks ahead of all word processors in sheer number of users. Only the Wang dedicated word processing machines have a comparable number of users.

When WordStar made its appearance, people were amazed at its file handling capabilities. Not only did it save all (not part) of your document, but it automatically saved the last version in a backup file.

WordStar is a powerful tool, but by now, it's an old warhorse squarely in the first generation of microcomputer word processors. WordStar cut its teeth on CP/M-80, an 8-bit operating system. Even Version 3.3 lacks some of the niceties of the latest offerings such as Benchmark, The Final Word, and Spellbinder. WordStar has no split screens, no macro capability, and no footnoting.

There would have to be a compelling reason to convince most WordStar fans to change over to some other word processor. They've already learned one set of control codes and command sequences. WordStar is geared to the touch typist who hates to leave home position—the cursor control sequences are so popular that they've been copied by many other application programs. In short, the upward migration path from WordStar to Brand X is questionable, at best.

In addition, an entire "piggyback" industry has developed around WordStar. There are numerous WordStar enhancements available (see Bibliography*, Footnote*, Grammatik*, and Spelling Check Software). MicroPro provides two main WordStar options of its own (for an additional charge) to handle spelling and mailing lists (see SpellStar* and MailMerge*).

Here are six commands you should commit to memory to master WordStar quickly:

1) WS Type from the DOS prompt (usually A>) to begin a WordStar session.

2) D Opens a file for your document after asking you its name.

3) CTRL-KD (hold down the CTRL key and type K and D) Saves the document to disk once you've typed it.

4) P Prepares to print a file after asking you its name.

5) ESC (press the key to the left of "!") When preparing to print a file, sets the default values for the print format.

6) X Exits WordStar and returns you to DOS.

Before you begin, be sure the three main WordStar files are on the disk in drive A. Their names are WE.COM, WSMSGS.OVR, and WSOVLY1.OVR..

WordStar Version 3.00* A very popular word processing program that is screen-oriented, CP/M-based, and can accomodate lines up to 240 characters in length. Some outstanding features include a very useful help menu, availability of all standard cursor controls, and paragraph reforming. 64K; 80-column card; printer. MicroPro International.

Work Habits for Job Success* Look at work habits that have proven themselves to be successful in getting jobs and obtaining promotions. Real-life work experiences are simulated so that you can test your decision-making skills. Mesa Research.

Workspace An area of memory allocated for working storage.

World and State Capitals* Includes over 100 tests on the capitals of the world and fifty U.S. states and capitals. Features single-key stroke answering system and lo-res graphics. American Avicultural Art & Science, Inc.

World Clock* Includes a real-time global simulation of the world as it turns through light and shadow. Other operating modes allow forecasting of any date and time using the global clock simulation, and a tutorial on the solstices, winter and summer, as well as spring equinox and other yearly changes. Color graphics are used in all displays and explanations are interesting and easy to understand. COM Press.

World Polar/Desert Regions* Teaches third grade students about particular climate regions, animal life, and vegetation. Disk and cassette. Right On Programs.

Wozpak II* Includes line number cross-reference, symbol cross-reference, renumber, append, Machine Code relocation, tape verify, hi-res graphics, and more. Puget Sound Program Library Exchange.

WPM Words Per Minute.

Write Away* Write Away is a word processor that runs in 40-or 80-column formats on the Apple II, Apple II+, or Apple IIe computers. The Apple II and Apple II+ must have at least 48K of RAM to use this program. If 16K or more of additional RAM is available, it can be used with a program called SWAP (available on the Write Away program disk) to swap the program's edit and format modules in and out of RAM. This program also requires at least one DOS 3.3 disk drive, a printer for hard copy, and a monitor. Additional memory (16K or more) is optional, but is quite useful with SWAP. An 80-column card is optional, but helpful, because it shows a "what you see is what you get" display on the screen. Write Away can be used with the Videx Videoterm*, M & R's Sup'R Term*, Vista's Vision 80*, Bit 3's Full-View 80*, ALS's Smarterm*, the Apple IIe 80-column Board*, and the Apple IIe Extended 80-column Board*.

This particular word processor is unquestionably versatile and powerful. Although powerful, it is rather inconvenient since the deferred command structure is cumbersome. The program should allow you to accomplish more with single keystrokes instead of requiring you to enter macros each time they are required. The program can be configured to operate a large number of printers and its menu-driven format module is handy. Unfortunately, the editor is just too unwieldy for most users. Midwest Software Associates.

Write Data to File BASIC. See PUT#.

Write Hebrew* A program that can teach reading and writing Hebrew cursive script to the person who can read Hebrew print. Seven units present the letters in a logical sequence. Two formats are present: for young children, a stick figure forms the letters; for older people, letters are formed without the stick figure. 48K. Institute for Computers in Jewish Life.

WRITE-ON!* A reasonably complete selection of editor functions; a line-oriented editor that uses a lot of prompts and user imputs to process editor commands. The print formatter supports a rather complete set of embedded format commands. Customizing can be accomplished by keyboard input after the printing has already begun. Multiple files can be printed. 32K. Datamost.

WRITE—Output Data from Memory Memory is any device which can store information and allow it to be retrieved when needed. The Apple relies primarily on random access memory (RAM), read-only memory (ROM), diskettes, cassettes and hard disks. ROM and RAM together make up the internal memory or main memory of the Apple, or any other computer.

Contrast this with external memory—such as cassette, diskette, and hard disk—which involves mechanical motion to retrieve data and is thus hundreds or thousands of times slower than internal memory. Data in internal memory is immediately available to programs for processing. Data in external memory must be copied into internal memory (READ or INPUT), processed, then copied back out to external memory (WRITE or OUTPUT).

If data has been created, it can be written out to external memory without a READ first. And, if data read in from external memory has not been modified, there is no need to write it back out since the original copy is still there.

Write-Protect Describes the act of preventing information from being written onto a storage medium. Floppy disk jackets often have adhesive tabs which can be removed or placed on the disk to write-protect it by disabling the disk drive's write circuitry. Cassettes have a similar plastic break-out tab.

Write-Protected Diskette A diskette is write-protected if it does not have a write-protect notch on the right side. The notch could be missing altogether (as on the original Apple System Master diskette) or covered over with an adhesive tab. This blocks a small spring-loaded switch or a light beam inside the diskette and is sensed by DOS diskette driver programs. You will get a WRITE-PROTECTED error message anytime you attempt to alter a file on a write-protected diskette by changing it, deleting it, copying a file onto the write-protected diskette, or formatting the diskette.

You are allowed to use files, load them, or copy from the write-protected diskette. The purpose of these limitations is to prevent accidental loss of the only copy of programs or data. In most cases, the procedure is to copy the write-protected diskette onto a notched diskette, put away the write-protected diskette as a permanent copy, then modify the notched diskette. In some cases you will remove the adhesive tab from the write-protect notch and proceed to change the diskette.

It is a good practice to put an adhesive tab (supplied with boxes of diskettes) over the write-protect notch of any important diskette you will backup. Then if you accidentally ask for the backup in the wrong direction (from the old diskette to your important diskette), you will get a second chance to make the backup, rather than losing your data.

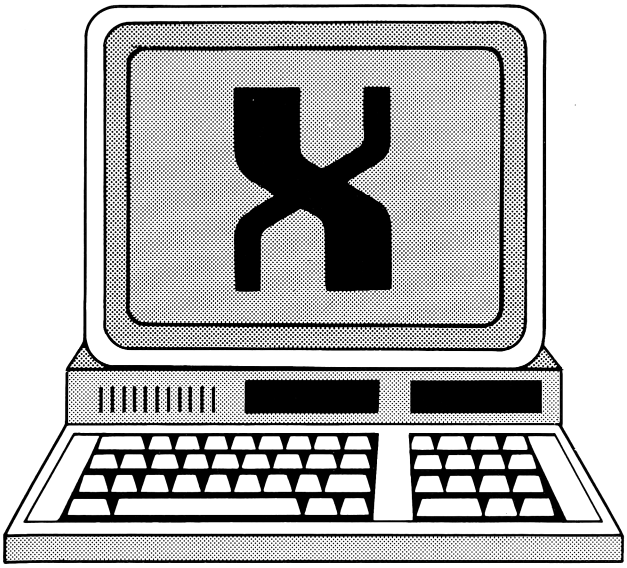
WRITE# WRITE# is an Apple III Business BASIC command which is used to write data in a specified format to one of several files which are open at the same time. Apple III Business BASIC allows the user to have as many as ten files open at the same time. As each file is opened, it is assigned a number by the user for controlling data flow to and from the file. The WRITE# command must be used in a very specific fashion, as the computer writes the required data sequentially to the file. The syntax is as follows:

WRITE# <file number>,<field number (optional)>;<expression 1 (from program)> expression format,<expression 2> expression format, etc.

One line of data is written to the file for each expression listed. If no field number is provided, the computer writes the data sequentially from the beginning of the first field. If data is longer than the record length of the file, an error message is displayed.

WS WorkSpace.

WV Working Voltage.



X Codes. ASCII = 88, HEX = 58. x = ASCII = 120, HEX = 78.

X Index Register.

XDRAW BASIC Statement. Allows you to draw an already specified shape at a particular location on the screen. The format is:

XDRAW <n> AT <m>,<p>

<n> is the number of the shape in the previously loaded shape table (q.v.).

<m> is the X coordinate.

<p> is the Y coordinate.

For each point plotted, the color will be the complement (green/orange, violet/blue, black/white) of the color which already exists at that point. A shape XDRAWn twice at the same place will draw it and then erase it without erasing the background.

XENIX The Microsoft implementation of the UNIX operating system for microcomputers.

XLOC XLOC is an Apple III Business BASIC command which is used to determine the cursor's horizontal position on its current line. This command may be used in the immediate mode by preceeding it with a PRINT command. It may also be used in a program line to return a value determined by the cursor's position.

XMIT TransMIT.

XMT TransMiT.

XPLO* This is Version 5 of this language with full floating point mathematics included. 48K; APEX DOS. The 6502 Program Exchange.

XPLOT See Reserved Words. This reserved word is not currently used by Applesoft, but it still must be avoided in the designation of variable names (q.v.).

XR EXternal Reset.

XREF/65* A cross-reference program for LISA—vital for program development, debugging, and documentation. XREF/65 lists all defined program labels, Sort 2.0 alphabetically and numerically sorts LISA 2.0 symbol tables and prints them in an 80-column format, SC Assembler II V3.2 files are converted to LISA, and more. Lazer Systems.

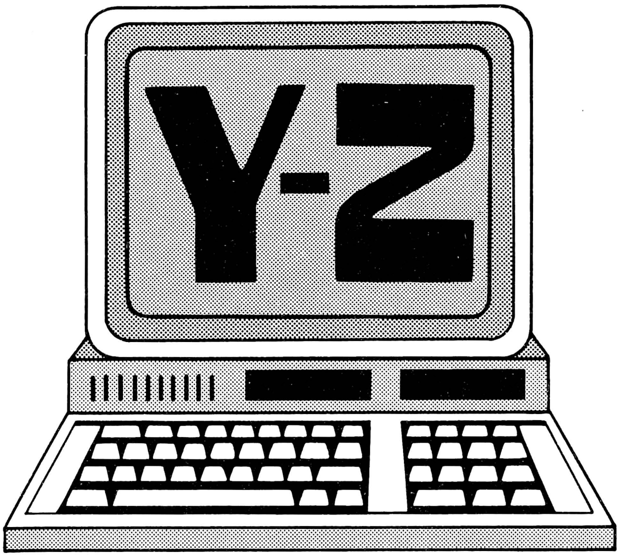
XTAL CrysTAL.

X-Y Plotter A device which draws points or lines on a sheet of paper based on X and Y coordinates from a computer.

XYCOLOR An Apple III Business BASIC command which makes the computer return the color of a dot at the screen location specified by the X and Y values supplied by the program or the user. The value of this color is an integer which agrees with the value of the color as listed on the color table for the display being used.

X10 Interface Board and Measurement Devices* Acquisition and control modules that include digital input sensing, analog input sensing, analog output control, and digital output control. Connecticut Microcomputer.

X-10 Interface Option* This interface, when connected between your Apple and a BSR X-10 Ultrasonic Command Console, permits your computer to control the BSR Home Control System. The package includes two scheduling programs—one that contains the actual event schedule, and another which runs the schedules in real-time. The program runs in the computer "background" permitting other programs to run in the foreground. Thunderware, Inc.



Y Codes. ASCII = 89, HEX = 59. y = ASCII = 121, HEX = 79.

Yield The proportion of operational chips in a production batch. Yield = good chips/total chips on a wafer.

YLOC An Apple III Business BASIC command which is used to determine the cursor's current vertical position on the screen. This command may be used in the immediate mode preceeded by a PRINT statement, or it may be used in a program line to return a value associated with the cursor's vertical position.

Z Codes. ASCII = 90, HEX = 5A. z = ASCII = 122, HEX = 7A.

Z Impedance measured in ohms. Also, The Zero Flag.

[Z] Z is a parameter which may be used with the PIP program in CP/M. This parameter turns the parity bit on all ASCII characters in the file being processed to a value of zero.

Zapper* A mathematical formula that creates high-resolution art. Applesoft. Paul's Electric Computer.

Zardax* A word processor that features user compatibility, fast disk access using 3.3 text files, a glossary, easy formatting, complete mailmerge facilities, and upper and lower case. The system can be used with 40-column Apple computers, Vision-80*, Smarterm*, or Videx's Videoterm* 80-column boards. 48K or 64K. Action-Research Northwest.

Z-Card* The powerful CP/M operating system can be implemented on your Apple computer to give you access to the thousands of software programs available. Supplied on an easy-to-install board, the Z-Card provides the capability of exploring a whole new pool of software. Advanced Logic Systems.

Zebra Finch Genetics* Contains a chart for classifying up to 400 possible combinations of Zebra Finch phenotypes. Low-res graphics display ten examples of Zebra Finch color distributions. American Avicultural Art & Science, Inc.

Zero Page The Machine language programs are stored in this location, from 0 to 255 decimal. The Systems Monitor, Applesoft BASIC and DOS are among these programs. See Page of Memory.

Z.E.S. System of Computer Aided Instruction* A menu-driven system that includes full-color graphics, students' progress reports, copies of completed exams, and creation of lessons. A 130-page instruction manual is included along with the graphics, program, module, and module format/copy disks. 48K. Avant-Garde Creations.

Zilog Manufacurer of the Z-80 and many other widely used chips. Zilog also publishes technical reference material on the Z-80 and other microprocessors.

Zone To skip over while printing. See Print Zones.

Zones Each group of sixteen spaces across the print line is called a print zone. A comma in the PRINT list of items to be printed means "start printing the following item at the start of the next print zone." Contrast this with the semicolon (;), which means "the next item is to print immediately after this one, without even a single space between." The print zones begin in columns 1, 17, 33, 49 and 65. If you have more than five items in your PRINT list, the sixth item will be printed in column 1 of the following line on the printer, the seventh item in column 17 of the second line, etc. See Print Lines.

Zoom* This program allows you to load pictures from disk, print partial or full-screen, print format selection, and gives you hi-res preview. Smart Ware.

Zoom Grafix* A menu-drived program that creates graphs, charts, or images with the commands for enlargement, decreasing, and horizontal or vertical print. The user may also "zoom in" on specific areas of the screen for printing. 48K. Phoenix Software, Inc.

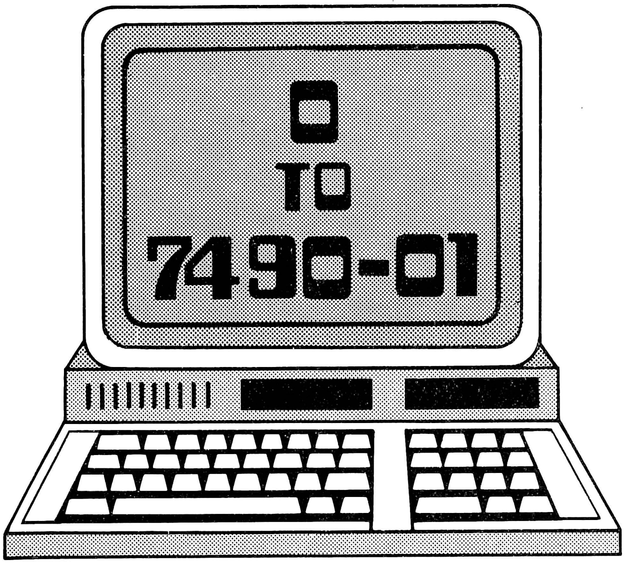
Zork I: The Great Underground Empire* A fantasy adventure that is the first chapter in the Zork Trilogy. The players journey through the caverns and mazes of the Underground Empire, and encounter perils ranging from the mystical to the macabre. Infocom, Inc.

Zork II: The Wizard of Frobozz* More wonders and dangers unfold before the adventurers when Zork II steers them into new depths of the subterranean realm. Surrounded by dragons and demons, players meet the Wizard, exiled from the Great Underground Empire ages ago. Infocom, Inc.

Z-Term* A program that links to other computers via a modem. Features include facilities to upload and download files, macro capability, and a terminal emulation section. The program is menu-driven and relatively easy to use. 48K; 8080 Assembly language; Z-80 card; and modem. Southwestern Data Systems.

Z-Term "The Professional"* A powerful terminal program which may be used with a modem and an Apple II or Apple II+ computer equipped with a Z-80 card. Z-Term Pro requires an Apple II or Apple II+ with 48K RAM and Microsoft data communications for the CP/M user. Z-Term supports auto answer and data transfer without an operator present. The program operates on the Apple's 40-column screen and with an 80-column card. It is compatible with the D.C. Hayes MicroModem IIe*, the Apple Communications Card*, Emtrol System's LYNX*, the Novation Apple CAT*, the SSM A10 Board*, the Mountain Hardware CPS card*, and the Microperipheral Corporation's MicroConnection*. In addition to having a great deal of versatility, the program allows for the use of macros to accomplish lengthly dialing sequences and connections, and to carry out complex load and save operations. The program disk does not contain the CP/M operating system. Therefore, it must be added by using COPY or DISCOPY. It is an extremely useful program for data communications in CP/M. The manual is a little confusing, but is quite complete. Southwestern Data Systems.

Z-80 Softcard* Adds the power of the Z-80 microprocessor to your Apple and gives you access to a large amount of software. It plugs into any slot except zero (four is recommended). Two disks accompany the Softcard to allow its use on a system that has not been upgraded to DOS 3.3. 48K. Microsoft Consumer Products.



0 To set the printer for the line spacing of 8 lines per inch, enter BASIC statement:

```
PRINT CHR$(27);“0”
```

See Type Formats—Printer for more information and examples.

1 For details on setting the printer for line spacing of 72/7 lines per inch, see 72/7 Lines per Inch.

2 For details on setting the printer for the line spacing of 6 Lines per Inch, see 6 Lines Per Inch.

3-D Supergraphics & Game Development System* Cartoon games and sample programs may be displayed in either color or black and white. Figures can be moved, changed, or rotated. The manual inefficiently explains sample programs, which may result in confusion. 32K. USA Software.

3-D Surface Plotters* Learn mathematical concepts while you create your own three-dimensional plotted designs. You can use hidden line or transparent plotting, and surface parameters can be varied through use of menu options. Designs may be saved on disk and easily accessed. Spectrum Software.

6 Lines per Inch To set the printer for this line spacing, enter BASIC statement:

```
PRINT CHR$(27);“2”
```

See Type Formats—Printer for more information and examples.

8″ Disk Controller—The Disk 2×2* A controller compatible with Apple DOS, Shugart 800/801 and 850/851 drives, and uses the standard IBM 3740 format. Sorrento Valley Associates.

8 Lines per Inch To set the printer for this line spacing, enter BASIC statement:

```
PRINT CHR$(27);“0”
```

See Type Formats—Printer for more information and examples.

8K Natal Package* Computes a total natal chart wheel with house system of your choosing. House cusps are to the minute and planets are in the house with retrogrades indicated. The wheel center has an aspectscope for each planet. Major aspects, angular separation and midpoints are shown. A program that is capable of calculating many charts for any place in the world—at a modest price. 8K. Matrix Software.

10 Characters per Inch Normal size print. To return to normal 10 characters per inch print size, you must turn off all non-standard print options currently turned on. See Type Formats—Printer for more information and examples.

10 Lessons in Algebra* The ten lessons include Rational Numbers, Sets and Subsets, Signs, and Polynomials. George Earl.

12 ASCII—Use for Form Feed To advance the paper to top of a page in the printer,enter BASIC statement:

```
PRINT CHR$(12)
```

or use the “top of form” or “form feed” manual control button (FF) on the printer.

You may need to adjust the paper in the printer so it actually is at the top of a page as defined by the perforations. In a program, you may want to provide instructions to the operator and a pause (q.v.) to allow for adjustment of the paper.

15 ASCII—Used for Compressed Print For this small type size, enter BASIC statement:

```
PRINT CHR$(15)
or
PRINT CHR$(143)
```

either in a program with line numbers at the point where you want to start printing in the small type, or directly without a line number. This gives 132 characters on the 8 inch line or about 16 characters per inch. To return to normal size print, enter:

```
PRINT CHR$(146)
```

See Type Formats—Printer for more information and examples.

16 Characters per Inch—Compressed Print For compressed print (small type size), enter BASIC statement:

```
PRINT CHR$(15)
or
PRINT CHR$(143)
```

either in a program with line numbers at the point where you want to start printing in the small type, or directly without a line number. This gives 132 characters on the 8-inch line, or about 16 characters per inch. To return to normal size print, enter:

PRINT CHR$(146)

See Type Formats—Printer for more information and examples.

16K Natal Package (An Astrology Program)* A total natal package with output including angles (RAMC, MC, ASC, VTX) and geo and helio planet longitudes and latitudes. Right ascension and declination are easily available. Also includes chart wheel of house, complete with aspectscope for analysis of planet aspects, angular separation, and midpoints. Aspects, angular separation and midpoints for all planets; moon, lunar node, midheaven, and ascendant are indicated on two different aspect grids. Midpoints can be sorted on all dials (360, 90, 45 degrees, etc.) and shown in either zodiac or 360-degree notation; user can scan harmonic charts or choose any one harmonic chart. This is a strong natal package for the 16K machine. Matrix Software.

16K Professional Package* A package of astrology programs including Solar and Lunar returns, a Natal Package, Tansits and Progressions, and Composite and Relationship charts. 16K. Matrix Software.

27 ASCII (ESCAPE) Enter ASCII 27 (ESCAPE) for printer control in PRINT statements to set lines per inch, page length, and print size, or use 128 + 27 = 155 to avoid complications in some programs. See Type Formats—Printer for more information and examples.

28 ASCII To move the cursor one space to the right, enter BASIC statement:

PRINT CHR$(28)

This only moves the cursor; it does not erase data on the screen.

29 ASCII To move the cursor one space to the left, enter BASIC statement:

PRINT CHR$(29)

This only moves the cursor; it does not erase data on the screen.

30 ASCII To move the cursor one space up, enter BASIC statement:

PRINT CHR$(30)

This only moves the cursor; it does not erase data on the screen.

31 ASCII To move the cursor one space down, enter BASIC statement:

PRINT CHR$(31)

This only moves the cursor, it does not erase data on the screen.

32K RAM* Includes Saturn's first three software packages with CP/M and Pascal pseudo-disks as options. Saturn Systems.

48 Tracks per Inch—Diskette Format See Double-Density, Diskette Drive, and Diskette Format.

49 ASCII—Setting the Printer for 72/7 Lines per Inch For information about setting the printer for the line spacing of 72/7 lines per inch, see 72/7 Lines per Inch.

50 ASCII—Turning Off Special Lines per Inch To return to the standard line spacing of 8 lines per inch after using a different lines-per-inch spacing, the special spacing must be turned off. Enter the BASIC statement:

PRINT CHR$(155);CHR$(50)

See Type Formats—Printer for more information and examples.

64K—Measurement of Bytes Storage in Computer Memory. A byte is a label for storage to hold one character (letter, digit, etc.) in computer memory, internal or diskette. Abbreviated B, or in thousands, KB, or simply K (actually, 1K = 1024 bytes because this is an even power of 2). The Apple IIe has 64K (or 64KB) of internal memory, or 64,000 bytes (to be precise, 64K = 64 x 1024 = 65,536 bytes). The Apple II/II+ can achieve this memory size through the use of a memory expansion card. The Apple III now has 256K installed.

72/7 Lines per Inch To set the printer for this line spacing, enter BASIC statement:

PRINT CHR$(155);"1"

or

PRINT CHR$(155);CHR$(49)

This line spacing is a good setting for spacing with compressed print.

To return to the standard 8 lines per inch, this special line spacing must be turned off. In order to do this, enter BASIC statement:

PRINT CHR$(155);CHR$(50)

See Type Formats—Printer for more information and examples.

79-FORTH ROM Card* Explore the FORTH language with this card that plugs into slot 0 of your Apple II computer. The card provides a complete system for developing FORTH programs, including an editor and Assembler, a compiler, and a 6502 Assembler (for defining low-level words). Offete Enterprises, Inc.

100-Color Drawing System, The* The most versatile two-dimensional graphics system presently available. Gives you these features: shrink module, text module, shape module and drawing module. Using this package, you can create animated figures and generate text on the hi-res screen. 48K. Penguin Software.

132 Characters per Line Compressed print. For this small type size, enter BASIC statement:

PRINT CHR$(143)

either in a program with line numbers at the point where you want to start printing in the small type, or directly without a line number. This gives 132 characters on the 8-inch line, or about 16 characters per line. To return to normal size print, enter:

PRINT CHR$(146)

See Type Formats—Printer for more information and examples.

205 Day Adjusted Weaning Weights* Compare the known or suspected birth weights of calves with their weaning weights, in order to determine superior genetic stock. A table of standard birth weights for particular breeds is included. AG-COM.

256K App-L-Cache* An add-on storage device that can increase your storage by 64K to 256K bytes without adding additional drives. With added memory, you can quickly access files and manipulate large databases without disk read/write delays. Storage is completely Apple DOS, CP/M, and Pascal compatible. 48K; DOS 3.3. Sorrento Valley Associates.

6502 Development System* A system that is available on disk, or EPROM with socket adapters to fit on the motherboard, or on a firmware board that plugs into slot 0 of your Apple. It contains the necessary tools for developing programs for 6502 Assembly language programs. Includes the Text Editor, Assembler, Disassembler, and the Debugger. Microproducts.

6502 Disassembler* Compatible with Hayden's Assembly Language Development System, this Disassembler produces source files with labeled subroutines and references from programs already in memory. Hayden Book Company.

6502 Macro Assembler* Generates relocatable code and has many handy utilities plus a text editor. United Software of America.

6502-C Processor Module* Features memory management hardware, supports one megabyte of programmable memory, and enables 6502 instructions to execute automatically across 64K boundaries. Also has a dynamically variable clock, autosynchronized input-output functions, memory write-protect. Number Nine, Inc.

6522 Apple II Interface* A board that provides an interface for printers, synthesizers, A/D-D/A converters, keyboards, and more. I/O are TTL compatible. Available as a bare board, kit, or assembled. John Bell Engineering, Inc.

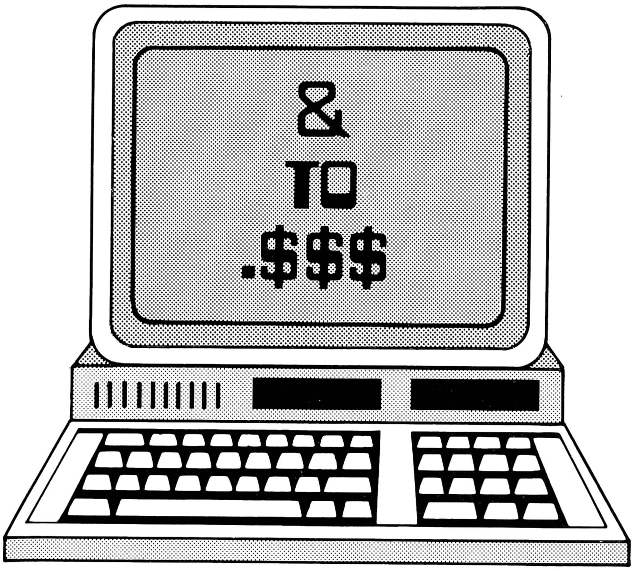
7114-01A PROM Module* With this module, you can add or replace Apple II firmware more easily (leaving the Apple II ROMs in place). Use the switch provided to toggle between applications. California Computer Systems.

7424 Calendar/Clock Module* A real-time clock board which connects to your computer to give you the time of day (12-hour or 24-hour format) and the date (month, day, year) with an adjustment for leap years. California Computer Systems.

7440-01 A Programmable Interrupt Timer Module* Use this board to time events in four different modes using three 16-bit timers to interrupt or redirect operation. California Computer Systems.

7470-01 DCD A/D Converter* An analog-to-digital converter that is generally used for monitoring temperature or pressure transducers for analysis. It is a single channel A/D with 400 ms per conversion. California Computer Systems.

7490-01(GPIB)* An Apple II general purpose instrument bus interface which is used to interface your computer to the IEEE-488 bus. California Computer Systems.



& A special character in BASIC, used by the Apple to access matching language subroutines by placing the JSR address at memory locations 1013-1015 (the ampersand hook).

* A special character in BASIC, indicating the times sign (multiplication); cannot be used for any other purpose.

***—Global File Name Characters** In CP/M file names, ? and * can be used as special wildcard characters to allow matching a whole group of files or one file from a partial specification. ? means any single character occurring in this position is considered a match; thus ABC? will match any four-character file name starting with ABC, including ABCA, ABCZ, ABCS, etc. * indicates that from this point on in the name, any characters (including blanks or none) are considered a match. So ABC* matches everything ABC? matches, plus all longer file names starting with ABC. The file ABCDE will match ABC* but not ABC?

The file extension is considered a totally separate match, with ? and * used in exactly the same way as in the file name. Global file name characters can be used in many DOS commands, including COPY, DIR, ERASE, etc. Global file name characters are not allowed in a command name. They may only be used in command parameters.

\ A special character in BASIC, called the backslash. It cannot be used for any other purpose. This symbol is not available directly from the keyboard on Apple II/II+. From BASIC, you can enter the following:

```
PRINT CHR$(92)
```

: A special character in BASIC, indicating the colon symbol.

:—Drive Name Delimiter In a CP/M file name, the : and . are specified to delimit drive name and extension, respectively. Parameters on DOS commands can be delimited (separated) by any of these characters: space, comma, semicolon, equal sign, or tab key.

:—Used for Multiple BASIC Statements on One Line You can put a colon (:) at end of one statement and continue entering another statement on the same line, without giving a new line number. The line number at left refers to all statements on the line.

, A special character in BASIC, indicating the comma delimiter.

,—Used in PRINT for Printer Each group of fourteen spaces across the print line is called a print zone. A comma (,) in a PRINT list of items to be printed means "start printing the following item at the start of the next print zone." Contrast this with the semi-colon (;), which means "the next item is to print immediatly after this one, without even a single space between." The print zones begin in columns 1, 17, 33, 49, and 65. See Print Lines.

,—DOS Command Delimiter Parameters on DOS commands can be delimited (separated) by any of these characters: space, comma, semicolon, equal sign, or tab key. In a file name, the : and . are specified to delimit drive name and extension, respectively.

,,—Used in Print Line To leave space on the print line between items, put an extra comma (,,) in the print list. Enter BASIC statement:

```
PRINT A,,B
```

This would print A in print zone 1, nothing in print zone 2, and put B in print zone 3 (col 33).

See Zones and Print Lines.

$ A special character in BASIC, indicating the dollar sign. Also, the string type declaration character.

$—Rules for Strings Names in BASIC must end in $ for 0 to 255 characters. String variable names (for characters) must start with a letter, can have up to forty characters, must not use any reserved words such as: IF, ON, THEN, GOTO, etc., or a reserved word followed by a type declaration character ($,%,?,!,). See Reserved Words—BASIC for complete list. Also, see BASIC—Variable Names.

= A special character in BASIC, indicating the equal sign. Also, an assignment symbol.

=—CP/M Command Delimiter Parameters on DOS commands can be delimited (separated) by any of these characters: space, comma, semicolon, equal sign, or tab key.

! A special character in BASIC, indicating the exclamation point. Also, the prompt in the mini-Assembler.

^ A special character in BASIC, indicating the exponentiation symbol or caret; cannot be used for any other purpose.

> A special character in BASIC, indicating the "greater than" symbol. Also, the prompt for Integer BASIC.

< A special character in BASIC, indicating the "less-than" symbol.

- A special character in BASIC, indicating the minus sign (subtraction); cannot be used for any other purpose.

A special character in BASIC, indicating the number, or pound, symbol.

####, Using ApplePRINT* Using the PRINT ####; <variable> statement does not interfere with the normal Applesoft PRINT statement. Worth the money in the time you save with report formatting, lists, tables, etc. Instructions and a sample program included. 32K. Malibu Microcomputing.

% A special character in BASIC, indicating the percent symbol. Also, the integer type declaration character; cannot be used for any other purpose.

%—Numeric Variable Integer (numeric) variables for whole numbers from -32768 to +32767 end in %, or start with a series of letters specified in a DEFINT statement.

Integer numeric variable names must start with a letter, can have up to forty characters, and must not contain or be any reserved words (such as IF, ON, THEN, GOTO, etc.), or a reserved word followed by a type declaration character ($,%,). See Reserved Words—BASIC for complete list. Also, see BASIC—Variable Names.

. A special character in BASIC, indicating the period or decimal point.

. (Period)—Extension Delimiter In a CP/M file name, the period (.) is specified to delimit the extension. See File—Kinds and Extensions.

+ A special character in BASIC, indicating the plus sign (addition); cannot be used for any other purpose.

? A special character in BASIC, indicating the question mark or PRINT abbreviation.

?—Global File Name Characters In CP/M file names, ? and * can be used as special wildcard characters to allow matching a whole group of files or one file from a partial specification. ? means any single character occurring in this position is considered a match; thus ABC? will match any four-character file name starting with ABC including ABCA, ABCZ, ABCS, etc. * indicates that from this point on in the name, any characters (including blanks or none) are considered a match. So ABC* matches everything ABC? matches, plus all longer file names starting with ABC. The file ABCDE will match ABC* but not ABC?

The file extension is considered a totally separate match, with ? and * used in exactly the same way as in the file name. Global file name characters can be used in many DOS commands, including COPY, DIR, ERASE, etc. Global file name characters are not allowed in a command name. They may only be used in command parameters.

?—Prompt A program's way of letting you know which program is waiting for you to type in information. ? is the prompt from a program written in the BASIC language, that is running and needs you to type in data to answer a question. In this case, it is a good idea to include a descriptive prompt such as "Enter check amount xxxx.xx " in the program so the operator (or you) will know exactly what should be entered in response to the ? prompt. An example of how to do this follows:

```
100 INPUT "ENTER CHECK AMOUNT xxxx.xx"
          ,CHECKAMOUNT
```

which will give the operator using this program this prompt on the screen:

```
ENTER CHECK AMOUNT xxxx.xx ?
```

CP/M prompts are >A, and >B; the Apple III Business BASIC prompt is). >A is a prompt from DOS if you are working on diskette drive A (the leftmost drive) as the default drive. >B is also a DOS prompt when the default drive is B.

" A special character in BASIC, indicating the quotation mark or string delimiter; cannot be used for any other purpose.

' A special character in BASIC, indicating the single quotation mark or apostrophe; cannot be used for any other purpose.

(A special character in BASIC, indicating the left parenthesis; cannot be used for any other purpose.

) A special character in BASIC, indicating the right parenthesis.

)—Apple III BASIC A symbol that is used for the prompt (q.v.).

; A special character in BASIC, indicating the semicolon symbol.

;—CP/M Command Delimiter Parameters on DOS commands can be delimited (separated) by any of these characters: space, comma, semicolon, equal sign, or tab key. In a CP/M file name, the : and . are specified to delimit drive name and extension, respectively.

;—Used in PRINT for Printer Line Each group of fourteen spaces across the print line is called a print zone. A comma (,) in a PRINT list of items to be printed means "start printing the following item at the start of the next print zone." Contrast this with the semi colon (;), which means "the next item is to print immediately after this one, without even a single space between." The print zones begin in columns 1, 17, 33, 49, and 65. See Print Lines.

/ A special character in BASIC, indicating the division symbol or slash; cannot be used for any other purpose.

“”—Spacing To get one or more spaces between fields printed by your BASIC programs, use a literal of spaces like: "   ". To get several spaces between the printed values of A$ and B$, use:

```
PRINT A$;"      ";B$C$
```

See Print Zones.

__ A special character in BASIC, indicating the underline symbols; cannot be used for any other purpose. Not available from the keyboard of the Apple II/II+.

↓ (Down Arrow Key) Pressing the down arrow will move the cursor down one line in the same position on the screen it previously occupied. This function is common in text entry and in entering commands. The key is found on the Apple IIe and III only.

← (Left Arrow Key) Pressing the left arrow will move the cursor left one character. This is a deletion move in BASIC and in AppleWrite II*; in Apple Writer IIe, it is purely a cursor move.

→ (Right Arrow) Under CP/M, this key moves the cursor right one character and the corresponding character is copied from the template. See Control Keys for related information.

→ (Right Arrow Key) Pressing the right arrow will move the cursor right one character. It will copy over any characters displayed on the screen as the cursor passes over them.

.ASM CP/M file extension that identifies a program file for conversion to Assembly language by a Macro Assembler.

.BAK The CP/M file extension for a copy of a file made by WordStar* and some other programs before changes are made. If the edit fails, the original data can be retrieved from the .BAK file. If the edit succeeds, the .BAK file is deleted. See File—Kinds and Extensions.

.BAS The CP/M file extension for a BASIC source program. Keep in mind that BASIC programs (.BAS extension) are not executed as programs by DOS; they are interpreted as source code data by the BASIC interpreter, which is itself a program (.COM extension) being run by DOS. See BASIC Interpreter. Also, see EXE2BIN, Programs, Source; Object; and File—Kinds and Extensions.

.COM The CP/M extension for a command file used by DOS or other directly executable programs.

.DOC The CP/M file extension for a text format or documentation file.

.HEX The CP/M file extension for a file that contains hexadecimal data in ASCII representation. See File—Kinds and Extensions.

.INT A CP/M file extension that identifies a program file that is written in BASIC but has been compiled.

.LST A CP/M file extension that identifies a file containing ASCII data for listing or for handling by a Macro Assembler.

.PAS The CP/M file extension that identifies a file written in Pascal.

.PRN A CP/M file extension that identifies a file containing an Assembly language program for listing.

.REL A CP/M file extension that identifies a file containing relocatable data which is stored in binary code.

.SUB A CP/M file extension that identifies a text file containing the CP/M operating system.

.TMP The CP/M file extension for a temporary file created by system programs.

.TXT The CP/M file extension for a text or documentation file.

.$$$ The temporary extension used by WordStar* and other programs for a modified file.

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Computer Entreprenuer
Publishing Co, The
P.O. Box 183
Rowayton, CT 06853
Phone: 800-227-3800

Computer Forum
14052 E. Firestone Blvd.
Santa Fe Springs, CA 90670

Computer Games
511 Iowa Ave.
Iowa City, IA 52240

Computer House Div./FLC, Inc.
1407 Clinton Rd.
Jackson, MI 49202

Computer Learning Connection
One Boston Place
Boston, MA 02108

Computer Micro Works, Inc.
P.O. Box 33651
Dayton, OH 45433
Phone: 513-878-8533

Computer Outlet
Park Place-Upper Level
1095 E. Twain
Las Vegas, NV 89109
Phone: 800-634-6766

Computer Pathways
Unlimited, Inc.
2151 Davcor St., S.E.
Salem, OR 97302

Computer Plus
795 W. Imperial
Brea, CA 92621
Phone: 714-990-3933

Computer Products
International, Inc.
3225 Danny Park
Metairie, LA 70002
Phone: 504-455-5330

Computer Programs Unlimited
9710 24th Ave., S.E.
Everett, WA 98204
Phone: 206-337-5888

Computer Research, Inc.
1879 South Main St.
Suite 104
Salt Lake City, UT 84115
Phone: 801-484-7316

Computer Science Institute
9620 N.E. 2nd Ave.
Miami Shores, FL 33138

Computer Science Press, Inc.
11 Taft Ct.
Rockville, MD 20850
Phone: 301-251-9050

Computer Shack
1635 S. Prairie
Pueblo, CO 81005
Phone: 303-564-3545

Computer Solutions of Australia
6 Maize Place
Mansfield, Queensland
Australia

Computer Sorts Systems
22713 Ventura Blvd.
Suite F
Woodland Hills, CA 91364

Computer Stations, Inc.
11610 Page Service Dr.
St. Louis, MO 63141
Phone: 314-432-7019

Computer Stop, The
16919 A Hawthorne Blvd.
Lawndale, CA 90260

Computer Systems
26401 Harper Ave.
St. Clair Shores, MI 48081
Phone: 313-779-8700

Computer Systems Design
2139 Jackson Blvd.
Rapid City, SD 57701
Phone: 605-341-3661

Computer Tax Service
P.O. Box 4845
Incline Village, NV 99450
Phone: 702-831-4300

Computer Technology Associates
118 Castellano
El Paso, TX 79912
Phone: 915-581-3500

Computer Textile, Inc.
10960 Wilshire Blvd.
Los Angeles, CA 90024

Computer Transceiver Systems, Inc.
P.O. Box 15
E. 66 Midland Ave.
Paramus, NJ 07652
Phone: 201-261-6800

Computer Translation, Inc.
P.O. Box 7004 University Station
Provo, UT 84602
Phone: 801-224-1169

Computer Wave, Inc.
6791 Westminster
Westminster, CA 92683

Computer Works, Inc.
789 E. Market St.
Harrisonburg, VA 22801
Phone: 703-434-1120

Computerized Construction
Mgt. Systems
27 So. Fort Ln.
Layton, UT 84041

Computerized Farm Information
Systems, Inc.
1710 Oldridge Ave. N.
P.O. Box 302
Stillwater, MN 55082
Phone: 612-436-7198

Computerized Management Systems
1039 Cadiz Dr.
Simi, CA 93065
Phone: 805-526-0151

Computerland (Grand Forks)
2500 B S. Columbia Rd.
Grand Forks, ND 58201
Phone: 701-746-0491

Computermart
2984 Daytona
P.O Box 1
Lake Havasu City, AZ 86903

Computers For Today, Inc.
31368 Colinas
Suite 101
Westlake Village, CA 91360

Computers In Psychiatry/Psychology
26 Trumbull St.
New Haven, CT 06511

Compu-Things
270 Broadway
Revere, MA 02151
Phone: 617-289-8866

Compu-Time
P.O. Box 5343
Huntington Beach, CA 92646
Phone: 714-536-5000

Computing Concepts
P.O. Box 250
Fredonia, NY 14063

Compu-Trac, Inc.
P.O. Box 15951
New Orleans, LA 70175
Phone: 800-535-7990/
504-895-1474

Compu-Tron Software Service
1414 S. Fairplain Ave.
Whittier, CA 90601

Computronics, Inc.
50 N. Pascack Rd.
Spring Valley, NY 10977
Phone: 800-431-2818

Compuvision
50 W. Brokaw,
Suite 64
San Jose, CA 95110
Phone: 408-947-4616

Compuware
15 Center Rd.
Randolph, NJ 07869
Phone: 201-366-8540

Comshare Target Software, Inc.
1935 Cliff Valley Way
Suite 200
Atlanta, GA 30329
Phone: 404-634-9535

Conduit
P.O. Box 388
Iowa City, IA 52244
Phone: 319-353-5789

Connecticut Information
Systems Co.
218 Huntington
Bridgeport, CT 06608
Phone: 203-579-0472

Connecticut Microcomputer
34 Del Mar Dr.
Brookfield, CT 06804
Phone: 203-775-4595

Consultant, The
414 Can-Dota
Mt.Prospect, IL 60056
Phone: 312-259-7224

Context, Inc.
833 W. Colorado
Colorado Springs, CO 80905
Phone: 303-471-9874

Context Management
Systems Inc.
23864 Hawthorne Blvd.
Suite 101
Torrance, CA 90505
Phone: 213-378-8277

Continental Software
11223 S. Hindry Ave.
Los Angeles, CA 90045
Phone: 213-410-3977

Convergent Systems, Inc.
245 E. 6th St.
Suite 257
St. Paul, MN 55101
Phone: 612-221-0587

Cook Computer Company
L905 Bailey Dr.
Marshallton, IA 50158

Co-Op Software
521 Hamilton
Geneva, IL 60134
Phone: 321-232-1984

C.O.R.P. Dynatech Microsoftware
7847 N. Caldwell
Niles, IL 60648
Phone: 312-470-0700

Corona Data Systems
31324 Via Colinas
Suite 110
Westlake Village, CA 91361
Phone: 213-991-1144

Corporation for Public
Information, The
1714 Illinois
Lawrence, KS 66044
Phone: 913-841-3095

Corvus Systems
2029 O'Toole Ave.
San Jose, CA 95131

Counterpoint Software, Inc.
Suite 140
Shelard Plaza N.
Minneapolis, MN 55426
Phone: 800-328-1223

Countryside Data, Inc.
718 N. Skyline
Idaho Falls, ID 83402

Cover Craft Corp.
P.O. Box 555
Amherst, NH 03031
Phone: 603-889-6811

CPAIDS
1061 Fraternity Circle Dr.
Kent, OH 44240
Phone: 216-678-9015

CPU Software
9710 24th Ave., S.E.
Everett, WA 98204

Crabapple Systems, Inc.
114 Commercial St.
Portland, ME 04101

Cramapple
P.O. Box 98
Cambridge B Branch
Boston, MA 02140
Phone: 617-628-0206

Crane Software Inc.
16835 Algonquin
Suite 61
Huntington Beach, CA 92649
Phone: 714-846-8005

Crawford Data Systems
P.O. Box 3000 561H
Camarillo, CA 93011
Phone: 805-484-4159

C.R.C. Wholesale
1437 Gordon St.
Allentown, PA 18102
Phone: 215-776-2100

Creative Computer
Peripherals, Inc.
Aztec Environmental Center
1044 Lacey Rd.
Forked River, NJ 08731
Phone: 609-693-0002

Creative Computing
39 E. Hanover Ave.
Morris Plains, NJ 07950
Phone: 800-631-8112

Creative Discount Software
256 S. Robertson
Suite 2156
Beverly Hills, CA 90211
Phone: 800-824-7888

Creative Software
6081 Barbados Ave.
Cypress, CA 90630
Phone: 714-893-4695

CRIC Software Systems
15132 Stony Plain Rd.
Edmonton, Alberta,
Canada
Phone: 403-483-5999

Criterion Systems Games
586 Kent Ln.
Shoreview, MN 55112
Phone: 612-483-0414

Cross Educational Software
P.O. Box 1536
Ruston, LA 71270
Phone: 318-255-8921

Crow Ridge Associates, Inc.
P.O. Box 1
New Scotland, NY 12127
Phone: 518-765-3620

Crystal Computer
17120 Monterey Rd.
Morgan Hill, CA 95037

Cuesta Systems, Inc.
3440 Roberto Ct.
San Luis Obispo, CA 93401

Cuisenaire Co. of America, Inc.
12 Church St., P.O. Box D
New Rochelle, NY 10805
Phone: 914-235-0900

Cyberia, Inc.
2330 Lincoln Way
Ames, IA 50010
Phone: 515-292-7634

Cyber-Tech
P.O. Box 924
Canoga Park, CA 91311
Phone: 213-702-2178

Cybertronics International, Inc.
999 Mount Kenable Ave.
Morristown, NJ 07960
Phone: 201-766-7681

Cyborg Corp.
55 Chapel St.
Newton, MA 02158

Dakin5 Corp.
7000 Broadway, Suite 304
Denver, CO 80221
Phone: 303-832-1501

Dark Star Systems
P.O. Box 140, Dept. A
Amherst, MA 01004

Darsemeyer Electronics
450 St. John's Rd.
Michigan City, IN 46360

Data Cast
345 Swett Rd.
Woodside, CA 94062
Phone: 415-851-8437

Data Compass Peripheral
Products Group
2730 Regal Park Dr.
Anaheim, CA 92806
Phone: 714-630-7450

Data Dynamics Technology
P.O. Box 1217
Cerritos, CA 90701
Phone: 213-926-9544

Data Frontiers, Inc.
P.O. Box 92423
Rochester, NY 14692
Phone: 716-227-5752

Data Mail
P.O. Box 818
Reseda, CA 91335
Phone: 800-635-5555

Data Security Concepts
P.O. Box 31044
Des Peres, MO 63131
Phone: 314-965-5044

Data Strike
125 N. 4th St.
Lacrosse, WI 54601

Data Systems, Inc.
1810 Chester Ave.
Bakersfield, CA 93386

Data Transforms, Inc.
616 Washington St., #106
Denver, CO 80203
Phone: 303-832-1501

Data-Basics
P.O. Box 4028
Culver City, CA 90230

Datacope
P.O. Drawer AA
Little Rock, AR 72205

Datam Consultants
P.O. Box 238
Dekalb, IL 60115
Phone: 815-758-1505

Datamost
8943 Fullbright Ave.
Chatsworth, CA 91311
Phone: 213-709-1202

Data-Rite Corp.
3086 Wheeling St.
Aurora, CO 80011
Phone: 303-366-5267

Dataroyal, Inc.
235 Main Dunstable Rd.
Nashua, NH 03061
Phone: 603-883-4157

DataSoft, Inc.
9421 Winnetka
Chatsworth, CA 91311
Phone: 213-701-5161

Data-Soft of NH
22 Stevens Ave.
Merrimack, NH 03054
Phone: 603-424-5217

Datassistance
40919 Paw Paw Rd.
Paw Paw, MI 49079

Davell Custom Software
P.O. Box 4162
Cleveland, TN 37311
Phone: 615-336-3055

David Data
12021 Wilshire Blvd.
Suite 212B
Los Angeles, CA 90025
Phone: 213-478-7865

Davidson & Associates
6069 Groveoak Place, #4
Suite 12
Rancho Palos Verdes, CA 90274
Phone: 213-378-7826

A.R. Davis & Co.
P.O. Box 24424
San Jose, CA 95154
Phone: 408-377-1678

Davka Corp
845 N. Michigan Ave.
Suite 843
Chicago, IL 60611
Phone: 800-621-8227/
312-944-4070

Day & Night Computers
4788 Scotts Valley Dr.
Scotts Valley, CA 95066
Phone: 408-438-5062

Decision Data, Inc.
213 Lincoln Way
Ames, IA 50010

Decision Resources
44 White Birch Rd.
Weston, CT 06883
Phone:203-222-1974

Decision Science Software
865 Castle Ridge Rd.
Austin, TX 78746

Decision Support Software
1438 Ironwood Dr.
McLean, VA 22101
Phone: 703-241-8316

Decision Systems
P.O. Box 13006
Denton, TX 76203

Decisionmakers, Inc.
3130 Impala Dr.
San Jose, CA 95117

Frederick E. Deeg and Associates
13234-A Fiji Way
Marina Del Rey, CA 90291
Phone: 213-823-0767

Denver Software Co.
P.O. Box 440140
Aurora, CO 80014
Phone: 303-750-9980

Desert Technology
P.O. Box 15113
Phoenix, AZ 85060

Desktech
413 I St.
P.O. Box 4
Arcata, CA 95521

Desktop Computers Software
303 Potrero St.
Santa Cruz, CA 95060
Phone: 408-458-9095

Desktop Solutions
P.O. Box 35659
Houston, TX 77235
Phone: 713-723-6170

Developmental Learning Materials
One DLM Park
Allen, TX 75002
Phone: 214-727-3346/
800-527-4747

Dickens Data Systems, Inc.
478 Engle Dr.
Tucker, GA 30084
Phone: 800-241-6753
Ext. 503/404-448-6177

Dicomed Corp.
9700 Newton Ave. S.
Minneapolis, MN 55431
Phone: 612-887-7100

Digi-Scan, Inc.
432 Broad St.
Shrewsburys, NJ 07701

Digital, Etc.
202 Main St.
Venice, CA 90291

Digital Images
P.O. Box 941005
Schaumburg, IL 60194
Phone: 800-222-1248

Digital Marketing
2363 Boulevard Circle
Walnut Creek, CA 94595

Digital Research
801 Lighthouse
P.O. Box 579
Pacific Grove, CA 93950
Phone: 408-649-3896

Digital Word Systems/
International Disk
7246 Remmet Ave.
Suite 101
Canoga Park, CA 91303
Phone: 213-992-0514

dilithium Press
8285 S.W. Mimbus
Suite 151
Beaverton, OR 97005
Phone: 503-646-2713

Dip, Inc.
745 Atlantic Ave.
Boston, MA 02111

Disco Tech
P.O. Box 11129
Santa Rosa, CA 95406

D.J.A.I. Systems, Inc.
Two Century Plaza
Suite 480
2049 Century Park East
Los Angeles, CA 90067

Disk Depot
731 W. Colorado Ave.
Colorado Springs, CO 90905
Phone: 303-473-7777

Diversified Software
Research, Inc.
5848 Crampton Ct.
Rockford, IL 61111
Phone: 815-877-1343

Don't Ask Computer Software
2265 Westwood Blvd.
Suite B-150
Los Angeles, CA 90064
Phone: 213-397-8811
Dormac, Inc.
P.O. Box 1699
Beaverton, OR 97075
Phone: 503-641-3128

Doss Enameling Company
1224 Mariposa St.
San Francisco, CA 94107
Phone: 415-861-2223

Double Gold Software
13126 Anza Dr.
Saratoga, CA 95070
Phone: 408-257-2247

Dow Jones Information Services
P.O. Box 300
Princeton, NJ 08540
Phone: 800-257-5114

Dow Jones News/Retrieval
See Dow Jones Information Systems.

Dresden Associates
P.O. Box 246
Dresden, ME 04342
Phone: 207-737-8594

Dresselhaus Computer Products
837 E. Acosta Ave.
Glendora, CA 91740
Phone: 213-914-5831

Dr. Daly's Software
Water St.
Darby, MT 59829
Phone: 406-831-2934

Duosoft Corportion
1803 Woodfield Dr.
Savoy, IL 61874
Phone: 217-356-7542

Dynacomp, Inc.
1427 Monroe Ave.
Rochester, NY 14618
Phone: 716-442-8960

Dynamic Microprocessor Associates
545 5th Ave.
Suite 602
New York, NY 10017
Phone: 212-687-7115

Dynatech Microsoftware, Inc.
7847 N. Caldwell Ave.
Niles, IL 60648
Phone: 312-470-0700

Dynax
179 Riveredge Rd.
Tenafly, NJ 07670

Dysan Software
Duplication Division
5452 Betsy Ross Dr., #0710
Santa Clara, CA 95050
Phone: 408-988-3472

Eagle Computer Furniture
6226 West Howard St.
Niles, IL 60648

Eagle Software Publishing, Inc.
993 Old Eagle School Rd.
Suite 409
Wayne, PA 19087

Earl, George
(George Earl Software)
1302 S. General MacMullen
San Antonio, TX 78237
Phone: 512-434-3681

Earthware/Geocomp
P.O. Box 30039
Eugene, OR 97403
Phone: 503-344-3383

East Side Software Co.
344 E. 63rd St.
Suite 14-A
New York, NY 10021
Phone: 212-355-2860

Eastcoast Software
40 Hockersville Rd.
Hershey, PA 17033
Phone: 717-533-8125

Eastern House Software
3239 Linda Dr.
Winston-Salem, NC 27106
Phone: 919-924-2889

Eastman Pub. Co., Inc.
15720 Ventura Blvd.
Suite 222
Encino, CA 91436
Phone: 213-995-0436

Eaton Printer Products
Technical Research Park
Riverton, WI 82501

Eclectic Systems Corp.
P.O. Box 1166
Addison, TX 75001
Phone: 800-527-3135

Ecom Associates, Inc.
8634 W. Brown Deer Rd.
Milwaukee, WI 53223

Ecosoft
P.O. Box 68602
Indianapolis, IN 46268
Phone: 317-255-6476

Eco-Tech, Inc.
2990 Lake Lansing Rd.
Suite 202
P.O. Box 776
East Lansing, MI 48823
Phone: 517-337-9226

Ed-Sci Development
460 Beacon St.
San Francisco, CA 94131
Phone: 415-282-7020

Edu Soft
P.O. Box 2560
Berkeley, CA 94702
Phone: 800-227-2778

Educational Activities, Inc.
1937 Grand Ave.
Baldwin, NY 11510
Phone: 516-223-4666

Educational Computing
3144 Valentino Ct.
Oakton, VA 22124

Educational Computing Systems
136 Fairbanks
Oak Ridge, TN 37830
Phone: 615-483-4915

Educational Courseware
3 Nappa Ln.
Westport, CT 06880

Educational Programming Systems
Address Unavailable

Educational Services Mgt. Corp.
P.O. Box 12599
Research Triangle Park, NC 27709

Educational Services of Alaska
P.O. Box 145
McGrath, AK 99627

Educational Software Professionals
38437 Grand River
Farmington Hills, MI 48018

Educational Systems Software
23720 El Toro Rd.,
Suite 210
El Toro, CA 92630

Educational Teaching Aids Div.
159 W. Kinzie
Chicago, IL 60610

Educational Time Sharing Systems, Inc.
4122 E. Chapman Ave.,
Suite 28
Orange, CA 92669

Educulture
1 Dubuque Plaza,
Suite 150
Dubuque, IA 52001
Phone: 800-553-4858

Edutech, Inc.
634 Commonwealth Ave.
Newton Center, MA 02159
Phone: 617-965-4813

Edu-Ware Services, Inc.
28035 Dorothy Dr.
Agoura, CA 91303
Phone: 213-706-0661

Edutech Corp.
415 Cambridge #14
Palo Alto, CA 94306
Phone: 415-325-9965

Eiconics, Inc.
200 Cruz Alta
Taos, NM 87571

Eidos Systems
2500 21st Ave. South
Nashville, TN 37212

Einstein Corp.
11340 W. Olympic Blvd
Los Angeles, CA 90064
Phone: 213-477-4539

Electrohome
809 Willington St. N.
Kitchover, Ont, Canada
Phone: 519-744-7111

Electronic Arts
2755 Campus Dr.
San Mateo, CA 94403
Phone: 414-571-7171

Electronic Communications, Inc.
P.O. Box 20221
Tallahassee, FL 32304

Electronic Courseware Systems
P.O. Box 2374 Stationa
Champaign, IL 61820
Phone: 217-359-7099

Electronic Information Systems
669 Clay St.
San Francisco, CA 94111

Electronic Protection Devices
54 Sum St.
Wlatham, MA 02154
Phone: 617-891-1813

Electronic Specialists, Inc.
171 South Main St.
P.O. Box 389
Natick, MA 01760

Electronic Systems Furniture
17129 S. Dings View Ave.
Carson, CA 90746

Electrovalue Industrial, Inc.
P.O. Box 157-N
Morris Plains, NJ 07950
Phone: 201-267-1117

Elliam Associates
24000 Bessemer St.,
Suite 47
Woodland Hills, CA 91367

Ellis Computing
3917 Noriega St.
San Francisco, CA 94122
Phone: 415-753-0186

Emerald Valley Publishing Co.
P.O. Box 5537
Eugene, OR 97405

Empire Software
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Wynnewood, PA 19096

Encyclopedia Britannica
Education Co
425 N. Michigan Ave
Chicago, IL 60611

Energy Games
649 Mission St.
San Francisco, CA 94105

Ensign Software
2312 N. Cole Rd.
Suite E
Boise, ID 83704
Phone: 208-378-8068

Enter Computer, Inc.
6867 Nancy Ridge Dr.
San Diego, CA 92121
Phone: 619-450-0601

Enterprise Systems, Inc.
2333 Waukegan Rd.
Bannockburn, IL 60015

Epson America
3415 Kashiwa St.
Torrance, CA 90505

EPYX/Automated Simulations
1043 Kiell Ct.
Sunnyvale, CA 94086
Phone: 408-745-0700

Equipment Environments, Inc.
P.O. Box 3442
87 ½ Chandler St.
Nashua, NH 03061

ESP Computer Resources, Inc.
P.O. Box 597
Hollis, NH 03049

Europress, Ltd.
68 Chester Rd.
Hozd Grove, Stockport SK7 5NY
U.K.

Evans Newton, Inc.
7335 E. Acoma Dr.
Scottsdale, AZ 85260

Eventide Clockworks, Inc.
265 West 54th St.
New York, NY 10001

Evolution Software, Inc.
1632 Bathurst St.
Toronto, Ont M5P3J5
Canada

Exec Systems
P.O. Box 192
Clinton, MD 20735
Phone: 301-868-5487

Executive Data Systems, Inc.
290 Interstate N.
Atlanta, GA 30339

Executive Peripheral Systems, Inc.
800 San Antonio Rd.
Palo Alto, CA 94303

Execuware
4530 Park Rd., Suite 348
Charlotte, NC 28209
Phone: 704-525-9881

Expotek
2723 W. Windrose, Suite 3
Phoenix, AZ 85029

Express Marketing
P.O. Box 1736
Poulsbo, WA 98370

Facts Management Systems, Inc.
302 Bird Rd.
Coral Gables, FL 33146
Phone: 800-327-7210

Far West Laboratory For
Educational Research
1855 Falson St.
San Francisco, CA 94103

Farmplan Computer Systems, Inc.
1055 Sunnyvale-Saratoga Rd.
Sunnyvale, CA 92626

Fast Louie's Discount Apple Software
P.O. Box 1495
Auburn, CA 95603

Fast-Track Computer Products
P.O. Box 456
Columbus, OH 43216

FCI, Inc.
1407 Clinton Rd.
Jackson, MI 49202
Phone: 517-782-2132

Fiberbilt Ikelheimer-Ernst, Inc.
8601 W. 26th St.
New York, NY 10001
Phone: 212-675-5820

Financial Software, Inc.
11401 Westridge Cr.
Chardon, OH 44024

Financial Systems, Inc.
P.O. Box 2021
Kearney, NE 68847

Firefly Computing
2075 N. Stadium Ln.
Provo, UT 84601

First Software, Inc.
5622 East Presidio
Scottsdale, AZ 85200

Flight Opps
3587 Birch St. #237
Newport Beach, CA 92660

FlipTrack Learning Systems
999 Main St.
Suite 200
Glen Ellyn, IL 60137
Phone: 312-790-1117

FM Panatronics Corp.
P.O. Box 1088
Stone Mountain, GA 30086

FMJ, Inc.
P.O. Box 5281
Torrance, CA 90510

Foard, David
P.O. Box 5701
Datton, OH 45405

Foggle Computing Corp
P.O. Box 5166
Spartanburg, SC 29304

Football
80 N. High St.
Chillicothe, OH 45601

Franklin Computer Corp.
2138 Route 38
Cherry Hill, NJ 08002
Phone: 609-482-5900

Franklin Software
1900 S. 25th St.
Lincoln, NE 68502

Friendly Software
302 Tobett Suite 138
Richland, WA 99352

Fullmer Associates
1132 Via Jose
San Jose, CA 95120

Funk Vocab-Ware
4825 Province Line Rd.
Princeton, NJ 08540

Furn Wood Manufacturing, Inc.
5664 S.W. Carmen Dr.
Lake Oswego, OR 97034

Future Solutions, Inc.
3198-H Airport Loop Dr.
Costa Mesa, CA 92626

Future Tech Distributors
P.O. Box 50878
Palo Alto, CA 94303

GAF Software
127 Mount Spring Rd.
Tolland, CT 06084

Galaxy
P.O. Box 22072
San Diego, CA 92122

Galfo, C. H.
6252 Camino Verde
San Jose, CA 95119

Garbo Software
212 W. Wood #25
Carlsbad, NM 88220

Gebelli Software
1771 Tribute Rd., Suite A
Sacramento, CA 95815
Phone: 916-925-1432

Geegery Software Works, The
P.O. Box 8028
Des Moines, IA 50301

General Technical Corp.
4101 N. St. Joseph Ave.
Evansville, IN 47712

General Videotex Corp.
377 Putnam Ave.
Cambridge, MA 02139

George Otis Companies
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Geotec
1920 NW Milford Way
Seattle, WA 98177

Gesu Ent.
15161 Vermont St.
Westminster, CA 92683

Gibson Laboratories
23192-D Verdugo Dr
Laguna Hills, CA 92653
Phone: 714-770-3088

GOCI Software
7710 Computer Ave.
Pentagon Office Pk., Suite 115
Edina, MN 55435

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Anaheim, CA 92805

Golden Knight Software
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Huntington, CT 06484
Phone: 203-929-6004

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Staten Island, NY 10309

Gordon Publications Inc.
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Winter Beach, FL 32971

Gourmet Software
671 Eden Ave.
San Jose, CA 95117

Great Divide Software, Inc.
8060 West Woodard Dr.
Lakewood, CO 80227

Great Lakes Digital Resources
P.O. Box 32133
Detroit, MI 48232

Great Plains Software
123 N. 15th St.
Fargo, ND 58102

Green, Wayne, Inc.
See Wayne Green, Inc.

Group Technology Ltd.
Check, VA 24072
Phone: 703-651-3153

Grover & Associates
7 Mt. Lassen Dr., Suite D11
San Rafael, CA 94903

Gryphon Microproducts
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Silver Spring, MO 20906
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Gryphon Systems
P.O. Box 755
Cardiff, CA 92007

GS Computer Enterprises
P.O. Box 8050
Ann Arbor, MI 48107
Phone: 313-665-6416

Guardian Software
P.O. Box 2
Highwood, IL 60040

Gusdorf Corp.
6900 Manchester Ave
St. Louis, MO 63143

H & H Scientific
13507 Pendleton St.
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H & H Trading Co.
P.O. Box 549
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H & W Computer Systems
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Pahrump, NV 89041
Phone: 702-727-4274

H.A.L. Labs
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Boston, MA 02135
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Happ Electronics, Inc.
4640 Island View
Oshkosh, WI 54901
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Hardcore Computing
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Harrel, Keith
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Harris Laboratories, Inc.
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Harrisonburg Computer Services
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Harrisonburg, VA 22801

Hartley Courseware, Inc.
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Phone: 616-942-8987

Harvest Computer Systems
203 West 11th St.
Alexandria, IN 46001
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Hayden Book Company
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Phone: 201-393-6000

Hayden Software
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Lowell, MA 08153
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Hayes Computer Systems
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High Order MicroElectronics Corp.
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Hill, Alan G., Software
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Cambridge, MA 02139
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200 S. Service Rd.
Roslyn Heights, NY 11577
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Little Genius, Ltd.
324 Regent St.
Albany House 504
London, England

LJK Enterprises, Inc.
7852 Big Bend Blvd.
St. Louis, MO 63119
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Cupertino, CA 95014

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Elliot City, MD 21043
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Mail Order Software
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55722 Santa Fe Trail
Yucca Valley, CA 92284
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Math Software
1233 Blackthorn Pl.
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Matrix Software
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Big Rapids, MI 49307
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157 S. Kalamazoo Mall
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Mimco, Inc.
1547 Cunard Rd.
Columbus, OH 43227
Phone: 614-237-3380

Mimic, Inc.
P.O. Box 921
Acton, MA 01720
Phone: 617-263-2101

Mind Systems Corp.
P.O. Box 506
Northampton, MA 01061
Phone: 413-586-6463

Mini Microcomputer Software
5835-A Peachtree Corners
Morcross, GA 30092
Phone: 404-447-4322

Minit Man Printing
134B W. Allegan St.
Otsego, MI 49078
Phone: 616-694-9141

Minnesota Educational
Computing Consortium
2520 Broadway Dr.
St.Paul, MN 55113
Phone: 612-373-2851

Mint Software
6422 Peggy Dr.
Baton Rouge, LA 70806
Phone: 504-766-2318

MJK Associates
122 Saratoga Ave.,
Suite 11
Santa Clara, CA 95050
Phone: 408-247-5102

Moneybee
6900 E. Camelback Rd.
Scottsdale, AZ 85251

Moneydisk
P.O. Box 1531
Richland, WA 99352
Phone: 509-943-0198

Monument Computer Service
P.O. Box 603
Joshua Tree, CA 92284
Phone: 800-854-0561

Morgan-Fairfield Graphics
P.O. Box 5457
Seattle, WA 98105
Phone: 206-632-1374

Morningstar
2535 College Ave. #301
Berkeley, CA 94704
Phone: 415-845-9111

Mountain Computer, Inc.
300 El Pueblo Rd.
Scotts Valley, CA 95066
Phone: 408-438-6650

Mountain Hardware
300 Harver West Blvd.
Santa Cruz, CA 95060

MPA Enterprises
P.O. Box 6020
Wyomissing, PA 19610

MSI
See Micro-Sparc, Inc.

MSSS D, Inc.
3412 Binkley
Dallas, TX 75205
Phone: 214-522-8051

Multi-Media Video, Inc.
3350 Scott Blvd., Bldg. 21
Santa Clara, CA 95051
Phone: 408-727-1733

Multi-Tech Systems, Inc.
82 Second Ave. S.E.
New Brighton, MN 55112
Phone: 612-631-3550

Muse Software
347 N. Charles St.
Baltimore, MD 21201
Phone: 301-659-7212

Mytopia Gameware Institute
P.O. Box 625
Sioux City, IA 51102

W.H. Nail Co.
275 Lodgeview Dr.
Oroville, CA 95965
Phone: 916-589-2043

Narom Industries
1264 Deer Trail Line
Libertyville, IL 60048

National Business Institute
407 Galloway St.
Eau Claire, WI 54701
Phone: 715-835-8525

National Educational Software
1879 Locust Dr.
Verona, WI 53593
Phone: 608-845-8410

National Home Computer
Game Exchange
P.O. Box 20929
Columbus, OH 43220

Natural Language Systems
411 Barber Ave.
Ann Arbor, MI 48103

Navic Software
P.O. Box 14727
North Palm Beach, FL 33408
Phone: 800-327-2133/305-627-4132

Nebs Computer Forms
78 Hollis St.
Groton, MA 01450
Phone: 617-448-6167

NEC Home Electronics USA
1401 Estes St.
Elk Grove Village, IL 60007
Phone: 312-228-5900

NEC Information Systems
1414 Massachusetts
Boxbors, MA 01719
Phone: 617-264-8000

Nestar Systems, Inc.
2585 E. Bayshore Rd.
Palo Alto, CA 94308
Phone: 415-493-2223

Netronics R & D, Ltd.
333 Litchfield Rd.
New Milford, CT 06776
Phone: 800-243-7428

Nibble
P.O. Box 325
Lincoln, MA 01773
Phone: 617-259-9710

Nibble Notch
4211 N.W. 75th Terrace
Lauderhill, FL 33319
Phone: 305-484-2346

Nibble/Micro-Sparc, Inc.
See Nibble

Nicholson, B. A. & Co.
271 Madison Ave.,
Suite 1007
New York, NY 10016

Nikrom Technical Products
25 Prospect St.
Leominster, MA 01453
Phone: 617-537-9970

Nilonel Mfg.
5 Stevens Rd.
Worcester, MA 01603

Nonagon Software
P.O. Box 1486
11185 San Pablo Ave.
El Cerritos, CA 94530
Phone: 415-237-4406

Norell Data Systems
3400 Wilshire Blvd.
P.O. Box 70127
Los Angeles, CA 90010
Phone: 213-257-2026

Northern Technology Books
P.O. Box 62
Evenston, IL 60204

Norton Utilities, The
2210 Wilshire Blvd.
Santa Monica, CA 90403
Phone: 213-399-3948

Notable Software
P.O. Box 1556
Philadelphia, PA 19105
Phone: 215-736-8355

Novation, Inc.
18664 Oxnard St.
Tarzana, CA 91356
Phone: 213-996-5000

N-Squared Computing
5318 Forest Ridge Rd.
Silverton, OR 97381
Phone: 503-873-5906

NTS Software
680 Arrowhead Ave.
Rialto, CA 92376
Phone: 714-845-2968

Number Nine, Inc.
P.O. Box 1802
Hartford, CT 06144
Phone: 203-233-8134

Oasis Systems
2765 Reynard Way
San Diego, CA 92103
Phone: 619-291-9489

Offete Enterprises Inc
1306 S. B St.
San Mateo, CA 94402

OHM Electronics
746 Vermont St.
Palatine, IL 60067

Omega Microware, Inc.
222 S. Riverside Plaza
Chicago, IL 60606
Phone: 312-648-4844

Omegasoft
P.O. Box 842
Camarillo, CA 93010
Phone: 805-987-6426

Omnico
3300 Buckeye Rd.
Atlanta, GA 30341
Phone: 404-455-8460

Ongoing Ideas
Rd #1, P.O. Box 20
Starksboro, VT 05487
Phone: 805-453-4442

Opportunities For Learning, Inc.
8950 Lurline Ave.
Chatsworth, CA 91311
Phone: 213-341-2535

Optimized Systems Software
10389-D Landsdale Ave.
Cupertino, CA 95014
Phone: 408-446-3099

Options 80
P.O. Box 471
Concord, MA 01742

Orange Computers, Inc.
10-1495 Bonhill Rd.
Mississauga, Ontario 25T 1M2
Canada

Orange Micro, Inc.
1400 Lakeview
Anaheim, CA 92807
Phone: 714-779-2772

Organic Software
6049 Douglas Blvd.
Suite 12
Roseville, CA 95678
Phone: 916-791-4747

Orion Business Systems
11777 Bernardo Plaza Ct.
Suite 102
San Diego, CA 92128
Phone: 619-485-8580

Orion Software Associates
147 Main St.
Ossing, NY 10562

Osborne/McGraw-Hill
2600 10th St.
Berkeley, CA 94710
Phone: 415-548-2805

Output, Inc.
P.O. Box 519
Plymouth, MI 48170
Phone: 313-397-1633

Overdrive Computer Corp.
1131 University Blvd. W.
Suite 2102
Silver Springs, MD 20902
Phone: 301-649-5359

O'Neill, Charles
3 C Liberty Ln.
Elk City, OK 73644
Phone: 405-225-2806

Pacific Bancorporation
Data Systems, Inc.
P.O. Box 6008
Bakersfield, CA 93386
Phone: 805-395-3231

Pacific Exchanges
100 Foothill Blvd.
San Luis Obispo, CA 93401
Phone: 800-235-4137/805-543-1037

Padmede Computer Services
351 Fleet Rd.
Hampshire, England

Pakre, Inc.
5230 N. Clark
Suite 5
Lakewood, CA 90712
Phone: 213-866-2581

Pansophics, Ltd.
Whistle Stop Mall
Rockport, MA 01966
Phone: 617-546-3104

Passport Designs, Inc.
785 Main St.
Half Moon Bay, CA 94019
Phone: 415-726-0280

Paul's Electric Computer
P.O. Box 74157
Los Angeles, CA 90004

PBL Corp.
P.O. Box 559
Wyzata, MN 55319
Phone: 612-473-8998

PCD Systems
P.O. Box 143
Penn Yan, NY 14527
Phone: 315-536-3734

Peachtree Software, Inc.
3445 Peachtree Rd., N.E.
Atlanta, GA 30326
Phone: 404-239-3000

Pear Software
407 Terrace
Ashland, OR 97520
Phone: 503-482-8122

Peelings II, Inc.
P.O. Box 188
Las Cruces, NM 88004
Phone: 805-526-8364

Penguin Software
830 4th Ave.
Geneva, IL 60134
Phone: 312-232-1984

People's Computer Co.
1263 El Camino Real
Menlo Park, CA 94025
Phone: 415-323-3111

Peripherals Plus
39 E. Hanover Ave.
Morris Plains, NJ 07950
Phone: 800-631-8112

Persimmon Software
502C Savannah St.
Greensboro, NC 27406
Phone: 919-275-5824

Personal Business Systems
4306 Upton Ave. S.
Minneapolis, MN 55410
Phone: 612-929-4120

Personal Computer Center
3819 W. 95th St.
Overland Park, KS 66206
Phone: 913-649-5942

Personal Computer Products, Inc.
16776 Bernardo Center Dr.
San Diego, CA 92128
Phone: 619-485-8411

Personal Computer Service
1515 Andrews Dr.
Las Cruces, NM 88001
Phone: 505-522-5543

Personal Software, Inc.
See VisiCorp

Peter Hohenbrink Software Co.
P.O. Box 866
Placentia, CA 92670
Phone: 714-993-4441

Phase One Systems, Inc.
7700 Edgewater Dr.
Oakland, CA 94621
Phone: 415-562-8085

Phoenix Software, Inc.
64 Lake Zurich Dr.
Lake Zurich, IL 60047
Phone: 312-438-4850

Physicians' Practice Management
1810 S. Lynhurst
Suite Q
Indianapolis, IN 46241
Phone: 317-248-0357

Physical Sciences, Inc.
Research Park
Andover, MA 01810
Phone: 617-475-9030

The Mike Piaser Company
13400 Thraves Rd.
Garfield Heights, OH 44125

Piccadilly Software
89 Summit Ave
Summit, NJ 07901

Pickham Software
312 S. Los Angeles St.
Los Angeles, CA 90013
Phone: 213-687-9530/800-874-3514

Pirates Harbor, Inc.
P.O. Box 8928
Boston, MA 02114
Phone: 617-227-7760

Plain and Simple Software
9003 Lexington, N.E.
Albuquerque, NM 87112

Popular Computing, Inc.
375 Cochituate Rd.
Framingham, MA 01701
Phone: 800-343-6474

Powersoft, Inc.
P.O. Box 157
Pitman, NJ 08071
Phone: 609-589-5500

Practical Peripherals, Inc.
31245 La Baya Dr.
Westlake Village, CA 91362
Phone: 213-991-8200

Practical Software, Ltd.
P.O. Box 3000
Pomona, NY 10970

Prentice-Hall, Inc.
200 Old Tappan
Old Tappan, NJ 07675
Phone: 201-767-5000

Princeton Graphics
195 Nassau St.
Princeton, NJ 08540
Phone: 609-683-1660

PrintaColor Corp.
5965 Peachtree Corners E.
Norcross, GA 30071
Phone: 404-448-2675

Printers Computer Services
770 S. Brea Blvd.
Suite 210
Brea, CA 92621
Phone: 714-990-3547

Pro Bike, Inc.
5020 N.W. 63rd
Oklahoma City, OK 73132
Phone: 405-721-6707

Professional Business Software
119 Fremont
San Francisco, CA 94105

Professional Computer Systems
318A Lincoln Ct.
Bloomingdale, IL 60108
Phone: 312-351-8817

Professional Medical Software
650 Foothill Blvd.
La Canada, CA 91011
Phone: 213-790-9054

Professional Software Technology, Inc.
55 Wheeler St.
Cambridge, MA 02138
Phone: 617-497-2077

Program Design, Inc.
95 E. Putman Ave.
Greenwich, CT 06830
Phone: 203-661-8799

Programmers' Software Exchange
2110 N. 2nd St.
P.O. Box 199
Cabot, AR 72023

Programming International
5 Harold Dr.
Suite 3
Nashua, NH 03060
Phone: 603-888-8610

Programs for Learning, Inc.
P.O. Box 954
New Milford, CT 06776
Phone: 203-355-3452

Progressive Software
P.O. Box 273
Plymouth Meeting, PA 19432

Prometheus Products, Inc.
45277 Fremont Blvd.
Fremont, CA 94538
Phone: 415-490-2370

Pro/Pac, Inc.
14925 Memorial Dr.
Suite 207
Houston, TX 77079
Phone: 713-496-1179

Pro/Tem Software
814 Tolman Dr.
Stanford, CA 94305
Phone: 415-938-2880

Puget Sound Program Library Exchange
304 Main Ave.
Suite 300
Benton, WA 98055
Phone: 206-932-6588

Pygmy Programming
P.O. Box 33070
Scottsdale, AZ 85257

Quad Systems
P.O. Box 260279
Tampa, FL 33685

Quadram Corp.
4357 Park Dr.
Norcross, GA 30093
Phone: 404-923-6666

Quality Educational Designs
P.O. Box 12486
Portland, OR 97212
Phone: 503-287-8137

Quality Software
21601 Marilla
Chatsworth, CA 91311
Phone: 213-344-6599

Quark Engineering
2525 W. Evans
Suite 220
Denver, CO 80219
Phone: 303-934-2211

Quelo
843 N.W. 54th
Seattle, WA 98107
Phone: 206-784-8018

Quinsept, Inc.
P.O. Box 216
Lexington, MA 02173
Phone: 617-862-0404

Qume Corp.
2150 Qume Dr.
San Jose, CA 95131
Phone: 408-942-4000

Raff Craft
P.O. Box 1754
Stillwater, OK 74074

Rainbow Computing
Golden Plaza Shopping Center
9719 Reseda Blvd.
Northridge, CA 91324
Phone: 213-349-5560

Rainbow Marketing
3111 Berkshire Rd.
Baltimore, MD 21214
Phone: 301-426-6812

R-Alpha Software
Queens Chapel Rd.
University Park, MD 20782
Phone: 301-779-6910

Rana Systems
20620 S. Leapwood Ave.
Carson, CA 90746
Phone: 213-583-2353

Random House School Division
400 Hahn Rd.
Westminster, MD 21157
Phone: 800-241-6402

R.C. Electronics, Inc.
5386 Hollister Ave.
Suite D
Santa Barbara, CA 93111
Phone: 805-964-6708

RCI Marketing
19517 Business Center Dr.
Northridge, CA 91324

RDA Systems
P.O. Box 1456
Lafayette, CA 94549
Phone: 415-283-0573

Reactive Systems, Inc.
40 N. Van Brunt St.
Englewood, NJ 07631
Phone: 201-568-0481

Reader's Digest Educational Division
Pleasantville, NY 10507
Phone: 914-241-5738

Real Estate Microcomputer Systems
526 N.W. 2nd St.
Corvallis, OR 97330
Phone: 503-757-8887

Real Estate Software
1450 W. Georgia St.
Vancouver, B.C. V6G 2T8
Canada

Reality Automation, Inc.
1804 Cocklebur
Rowling Heights, CA 91748
Phone: 213-947-9533

Realty Software
1116 8th St.
Suite F
Manhatten Beach, CA 90266
Phone: 213-372-9419

Reed Holdings, Inc.
221 Columbus Ave.
Boston, MA 02116
Phone: 617-536-7780

RE/International Systems Corp.
6404 Wilshire Blvd.
Los Angeles, CA 90048

Renaissance Technology Corp.
1045 Detroit Ave.
Concord, CA 94518
Phone: 415-676-5757

Reston Publishing Co.
11480 Sunset Hills Rd.
Reston, VA 22090
Phone: 703-437-8900/800-336-0338

Reston Software
11480 Sunset Hills Rd.
Reston, VA 22090
Phone: 800-336-0338

RGB Designs
890 Walsh Ave.
Santa Clara, CA 95050
Phone: 408-748-0400

R.H. Electronics Inc.
566 Irelan St.
Buelton, CA 93427
Phone: 805-688-2047

Rhino Robots, Inc.
P.O. Box 4010
Champaign, IL 61820
Phone: 217-352-8485

Right On Programs
P.O. Box 997
Huntington, NY 11743
Phone: 516-271-3177

Rising Sun Software
P.O. Box 11020
Oakland, CA 94602
Phone: 415-482-3391

Ritam Corp.
P.O. Box 921
Fairfield, IA 52556
Phone: 515-472-8262

Riverbank Software
P.O. Box 128
Smith's Landing Rd.
Denton, MD 21629
Phone: 301-479-1312

RKS Enterprises, Inc.
643 S. 6th St.
San Jose, CA 95112
Phone: 408-258-9086

RKS Industries, Inc.
4865 Scotts Valley Dr.
Scotts Valley, CA 95066
Phone: 408-438-5760

RMI Media Products, Inc.
120 W. 72nd St.
Kansas City, MO 94114
Phone: 800-821-5480

Robec, Inc.
Route 309
Montgomeryville, PA 18936
Phone: 215-628-4960

Robert J. Brady Co.
Bowie, MD 20715
Phone: 301-262-6300

Rocky Mountain Software
131 Water St.
Suite 210
Vancouver, B.C. V6M 4M3
Canada
Phone: 604-681-3371

Rogers Products Company, Inc.
249-B E. Emerson Ave.
Orange, CA 92665
Phone: 714-974-6302

Roklan Corp.
3335 N. Arlington Heights
Arlington, IL 60004
Phone: 312-392-2525

Rosen Grandon Associates
7807 Whittier St.
Tampa, FL 33167
Phone: 813-985-4911

Rosenberg, Jay
5 Fraser Ave.
Monticello, NY 12701
Phone: 914-794-4175

Mike Rowe Productions
1700 S. Highway 92
Sierra Vista, AZ 85635
Phone: 602-323-6190

RTR Software, Inc.
444 Executive Center Blvd.
Suite 225
El Paso, TX 79902
Phone: 915-544-4397

S & H Software
58 Van Orden Rd.
Harrington Park, NJ 07640
Phone: 201-768-3144

Salba Software
206 E. Cypress Ave.
Elmwood, IL 61529
Phone: 309-742-8123

Salvage, Frank
Address Unavailable

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4300 W. 62nd St.
P.O. Box 7092
Indianapolis, IN 46206
Phone: 317-298-5400

Sams, Howard W. & Co.
4300 W. 62nd St.
P.O. Box 7092
Indianapolis, IN 48206
Phone: 317-298-5400

Samurai Software
P.O. Box 5515, Dept A-1
Chula Vista, CA 92012-5515
Phone: 619-691-0609

San Juan Unified School District
6141 Sutter Dr.
Carmichael, CA 95608
Phone: 916-944-3614

Sandow Enterprises
4825 Geer Rd.
Hughson, CA 95326

Santa Clara Systems Inc.
1860 Hertog Dr.
San Jose, CA 95131
Phone: 408-287-4640

Sanyo Business Systems Corp.
1200 W. Artesia Blvd.
Compton, CA 90220
Phone: 213-537-5830

SAS Electronics
3091 North Bay Dr.
North Bend, OR 97459

Sat. Trac International
4543 Templeton Gap Rd.
Colorado Springs, CO 80909
Phone: 303-574-4150

Saturn Systems
See Titan Industries

S-C Software Corp.
2331 Gus Thomasson,
Suite 125
P.O. Box 280300
Dallas, TX 75228
Phone: 214-324-2050

Scarborough, Inc.
25 N. Broadway
Tarrytown, N.Y. 10591
Phone: 800-882-8222

Scelbi Publications
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Seymour, CT 06483

Scharf Software
P.O. Box 18445
Irvine, CA 92713
Phone: 714-557-9206

Scholastic, Inc.
730 Broadway
New York, NY 10003
Phone: 212-505-3000

School Courseware Journal
4919 N. Millbrook #222B
Fresno, CA 93726
Phone: 209-225-0953

School Office Software Systems
3408 Dover Rd.
Durham, NC 27707
Phone: 919-493-3363

Science Research Associates, Inc.
155 N. Wacker Dr.
Chicago, IL 60606
Phone: 800-621-0664

Scientific Software
P.O. Box 208
Wausau, WI 54401
Phone: 715-845-2066

Scitronics, Inc.
523 S. Clewell St.
P.O. Box 5344
Bethlehem, PA 18015
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Scott Foresman & Co.
Electronics Publishing
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Glenview, IL 60025
Phone: 312-729-3000

Scott Instruments
1111 Willow Springs Dr.
Denton, TX 76201
Phone: 817-389-9514

Scripps Data Systems, Inc.
9580 Black Mountain Rd.
San Diego, CA 92126
Phone: 619-695-1540

SEI
23605 George Washington Hwy.
Yorktown, VA 23692
Phone: 804-898-8386

Select Information Systems
919 Sir Francis Drake Blvd.
Kentfield, CA 94904
Phone: 415-459-4003

Selectone Corp.
Computer Product Division
28301 Industrial Blvd.
Hayward, CA 94545
Phone: 415-887-1950

Sensational Software
39 E. Hanover Ave.
Morris Plains, NJ 07950
Phone: 800-631-8112

Sensible Software
6619 Perham Dr.
W. Bloomfield, MI 48033
Phone: 313-977-3869

Sentient Software
P.O. Box 4929
Aspen, CO 81612
Phone: 303-925-9293

Serendipity Systems, Inc.
419 W. Seneca St.
Ithaca, NY 14850
Phone: 607-277-4889

Serra Software
536 Sahara Ave.
Las Vegas, NV 89104

Services Unique, Inc.
2441 Rolling View Dr.
Dayton, OH 45401
Phone: 513-429-0696

Sevedge, Bob
See Sevedge Software

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Phone: 415-490-3420

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Shafer Software
465 S. Mathilda Ave.
Suite 202
Sunnyvale, CA 94086

Shakti Systems, Inc.
P.O. Box 94543
Shaumburg, IL 60194

Shanali, Inc.
171 S. Livingston
Livingston, NJ 07039
Phone: 201-992-7971

Sherman Electronics
P.O. Box 63-04
Miami, FL 33163

Shoe String Software
1235 Candlelight
Houston, TX 77018

Sierra On-Line Systems
Sierra On-Line Building
Coarsegold, CA 93614
Phone: 209-683-6858

Sierra Software
536 E. Sahara Ave.
Las Vegas, NV 89104

Silicon Valley
652 Bair Island Rd.
Redwood City, CA 94063

Silicon Valley Systems, Inc.
1625 El Camino Real
Suite 4
Belmont, CA 94002
Phone: 415-593-4344

Simulation Software
6035 N. Maplewood Ave.
Chicago, IL 60659

Single Source Solution
2699 Clayton Rd.
Concord, CA 94519

Sirius Software
10364 Rockingham Dr.
Sacramento, CA 95827
Phone: 916-366-1195

Sir-Tech Software, Inc.
6 Main St.
Ogdensburg, NY 13699
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Skyline Computing Co.
518 Boston Post Rd.
Orange, CT 06477

S. Richard Slade Creative Marketing
P.O. Box 484
Santa Barbara, CA 93102
Phone: 805-687-5331

Sliwa Enterprises
P.O. Box 7266
Hampton, VA 23666

Small Business Computer Systems, Inc.
3815 Adams St.
Lincoln, NE 68504
Phone: 402-467-3591

Small Systems Group/VR Data
Folcroft Park
Folcroft, PA 19032
Phone: 800-345-8102

Smart Systems, Inc.
499 Sulky Ln.
Frederick, MD 21701
Phone: 301-694-8307

Smart Ware
2281 Cobble Stone Ct.
Dayton, OH 45431
Phone: 513-426-3579

Smith Micro Software
P.O. Box 604
Sunset Beach, CA 90742
Phone: 213-592-1032

Snave Systems
P.O. Box 957
Niles, IL 60648-0957
Phone: 312-966-4505

Society for Visual Education, Inc.
1345 W. Diversay Pkwy.
Chicago, IL 60614
Phone: 312-525-1500

Sof/Sys, Inc.
4306 Upton Ave. S.
Minneapolis, MN 55410

Soft Control Systems
P.O. Box 599
W. Milford, NJ 07480
Phone: 201-728-8750

Soft One
315 Dominion Dr.
Newport News, VA 23603

Soft Touch
P.O. Box 7200
Costa Mesa, CA 92626
Phone: 714-646-0810

Softagon
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Morristown, NJ 07960

Softalk Publishing, Inc.
7250 Laurel Canyon Blvd.
North Hollywood, CA 91603
Phone: 213-980-5074

Softape
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North Hollywood, CA 91602
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Softart Software
46 Green St.
Carver, MA 02330

Softcorp International
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Marina Del Rey, CA 90291

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Murphysboro, IL 62966

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Inglewood, CA 90301
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Softsmith
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Kansas City, MO 64141
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Softstalker
P.O. Box 689
1376 Overlook Dr.
Steamboat Springs, CO 80477
Phone: 800-552-1500

Softwand Software
3125 Vendome Terrace
Norfolk, VA 23509

Softswap
333 Main St.
Redwood City, CA 94063
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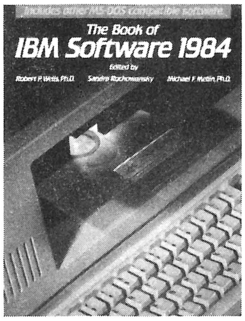
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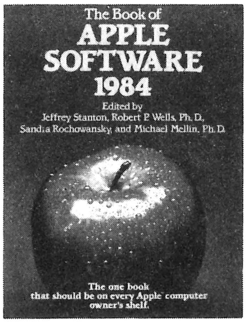
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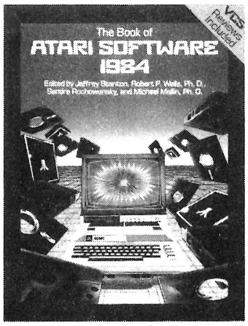
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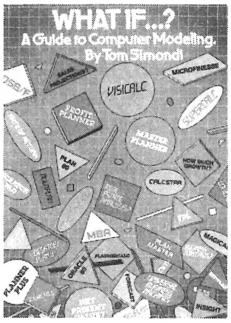
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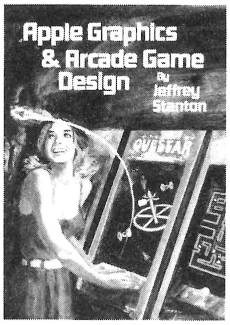
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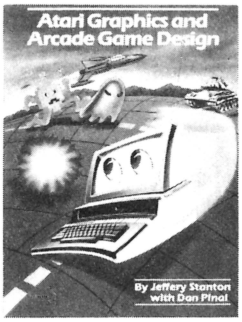
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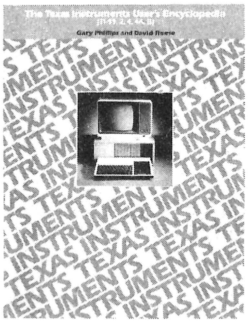
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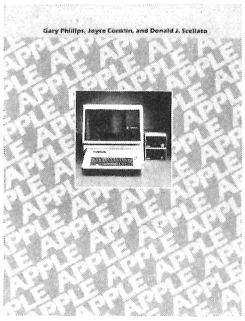
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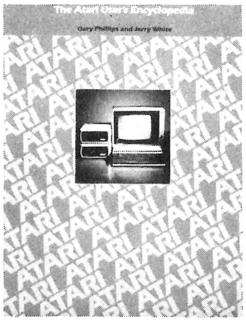
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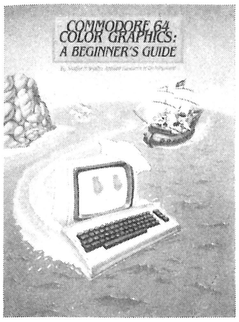
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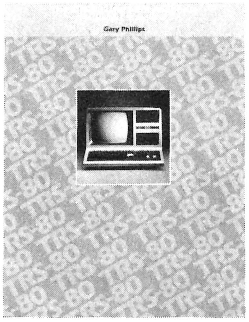
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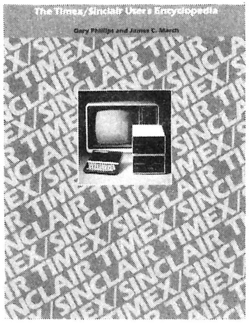
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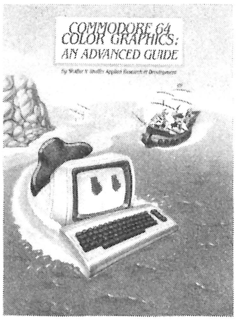
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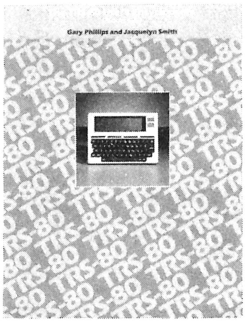
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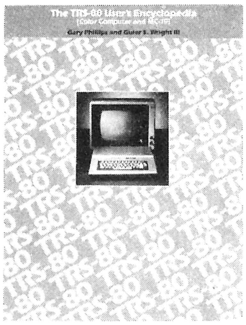
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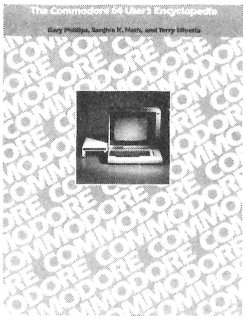
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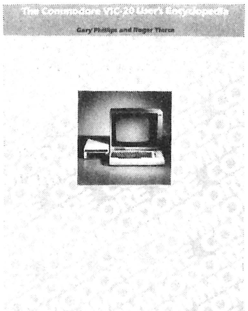
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